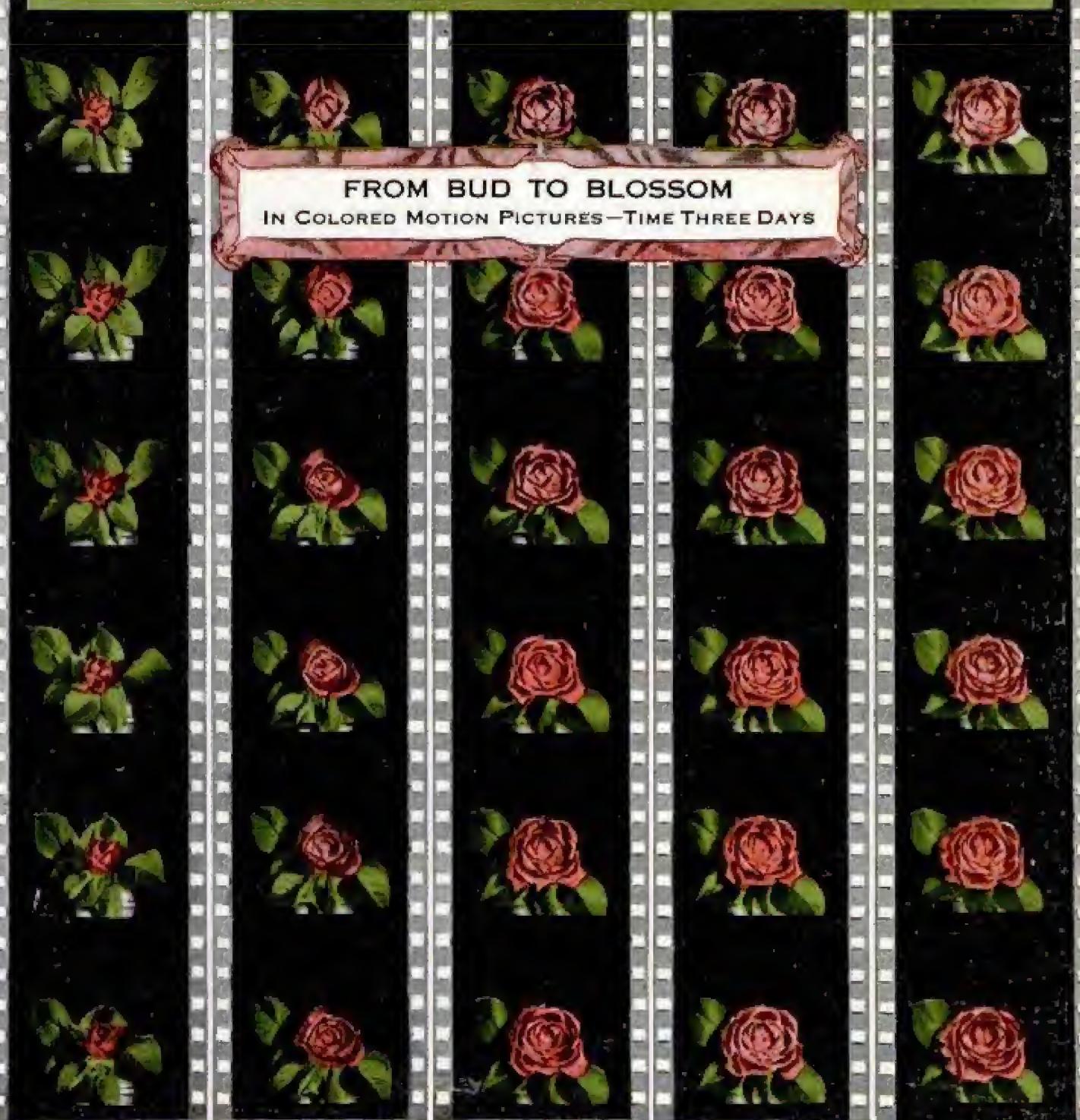


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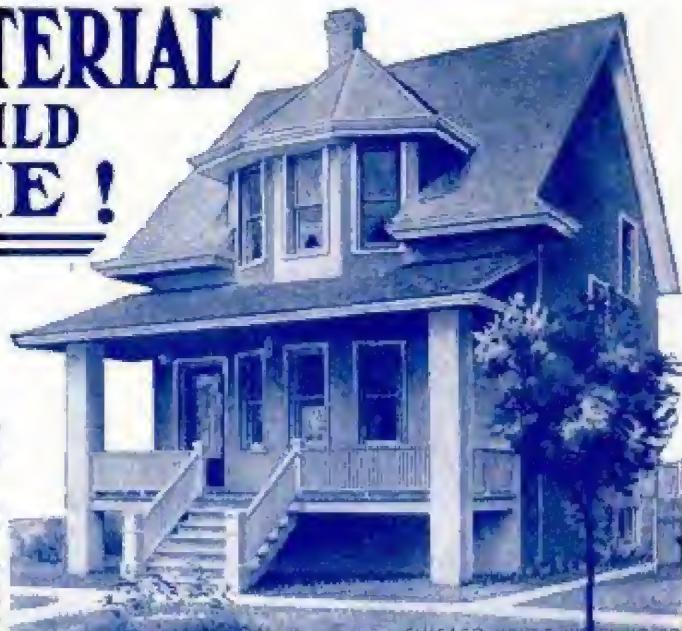
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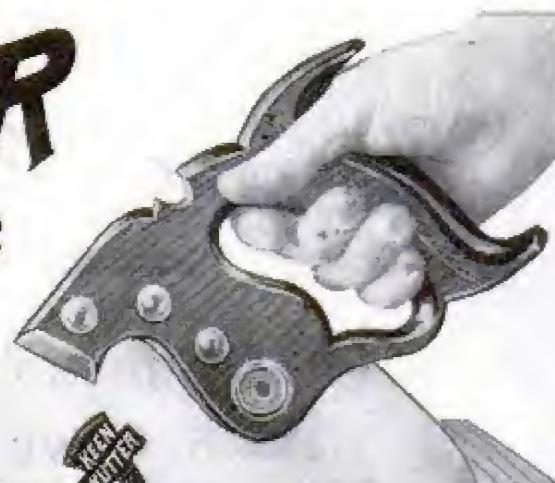
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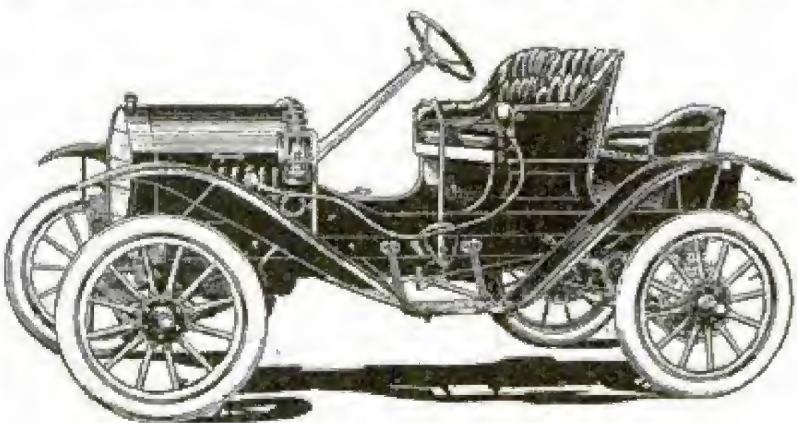
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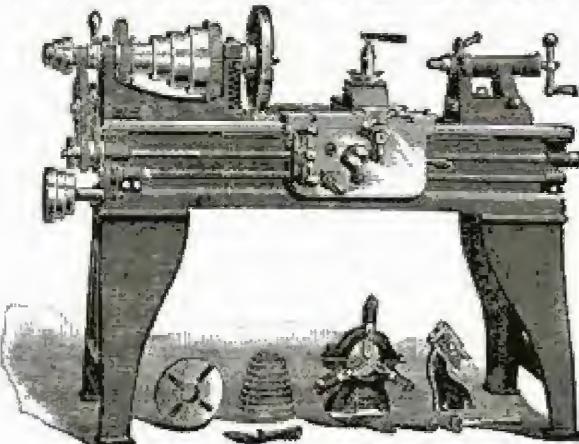
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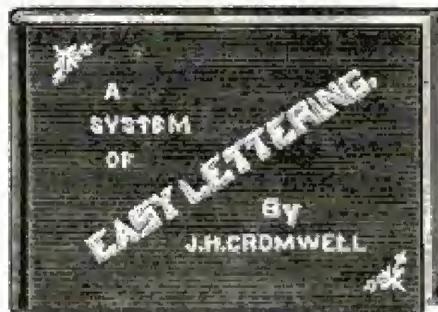
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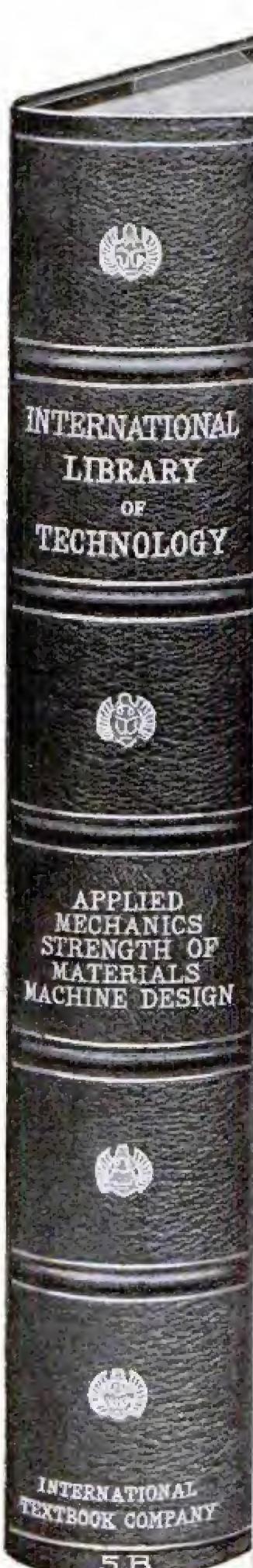
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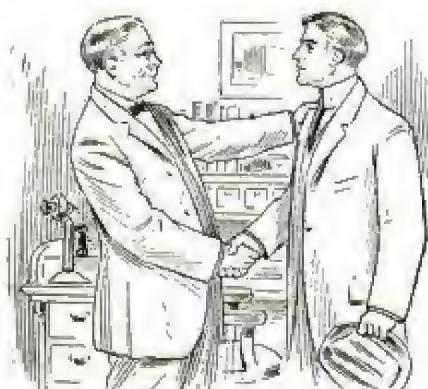
by Elbert Hubbard



Without his notes he is helpless



The lessons you learn are rot unless you retain them by memory



He never misses a face



OR some long time I have been promising myself to write up my good friend, Mr. Henry Dickson of Chicago, and I have not forgotten.

¶ Mr. Dickson is teaching a Science or System, whichever you choose to call it, which I believe is of more importance than the entire curriculum of your modern college.

**MR. DICKSON teaches Memory.**

Good Memory is necessary to all achievement.

¶ I know a man who is fifty-five years old. He is a student. He is a graduate of three colleges, and he carries more letters after his name than I care to mention. But this man is neither bright, witty, clever, interesting, learned nor profound.

He's a dunce.

And the reason is that he **CAN NOT REMEMBER**. Without his notes and his reference literature, he is helpless.

This man openly confesses that he can not memorize a date or a line of poetry, and retain it for twenty-four hours. His mind is a sieve through which sinks to nowhere the stuff that he pours in at the top.



**EDUCATION** is only what you remember. The lessons that you study into the night and babble about the next day in class are rot, unless you retain them and assimilate them by the slower process of memory. You can not gulp and discharge your facts and hope that they will do you good. Memory only makes them valuable.

EVERY little while in business I come across a man who has a memory, a **TRAINED MEMORY**, and he is a joy to my soul.

He can tell you when, where, why, how much, what for, in what year, and what the paper said the next morning.

Like this man is another, the general manager of a great corporation in a Western City. He never misses a face. If he sees you once that's enough. The next time he'll call you by name, inquire about the folks at home, and ask if you have recovered from that touch of rheumatism.

He told me how he did it. He told me that he studied memory-training with Professor Dickson of Chicago. Also, he said a lot of nice things about Professor Dickson, that I hesitate to write down here lest my good friend Dickson object.



**THIS** Dickson System of Memory-Training, as I understand it, and I do understand it, is very simple. If you want to enlarge your arm to increase the power and strength of your muscle, you exercise it. The same with your mind.

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To the man or woman whose memory plays you tricks, I especially recommend that you write to Professor Dickson to send you his literature. It will cost you nothing, and if his credentials and recommendations and the facts he sets forth, do not convince you, you are not to be convinced—that's all.

You do not know when you will be called to stand on your feet and tell what you know; then and there a trained memory would help you.



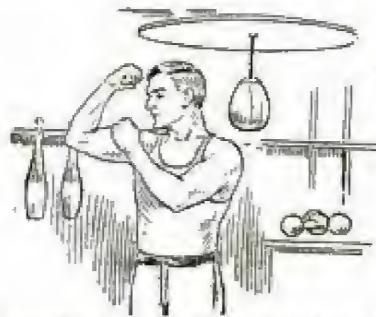
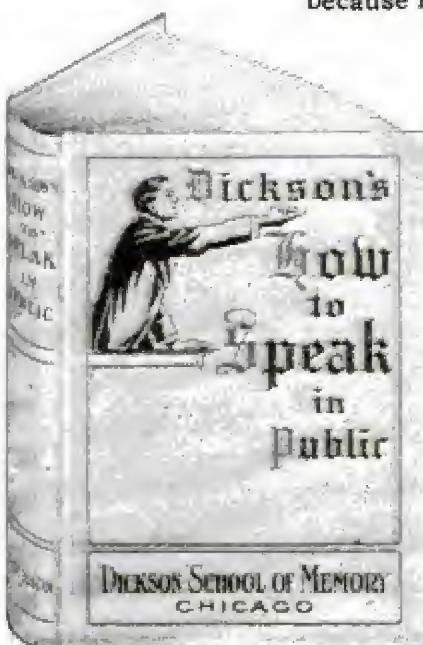
**YOU'VE** sympathized with the little girl who stuttered her "piece." But you've wept for the strong man who stammered and sucked air and gurgled ice-water and forgot, and sat down in the kindly silence. In the child it was embarrassment, but in the adult it was a bad memory.

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If you want to enlarge your arm, you exercise it. The same with your mind



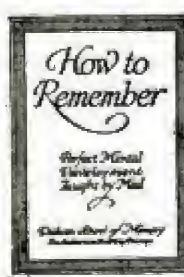
The man whose memory plays tricks



The little girl who stuttered her piece



The strong man who stammered and sucked air and gurgled ice water and forgot.



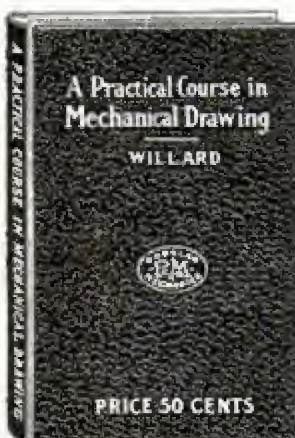
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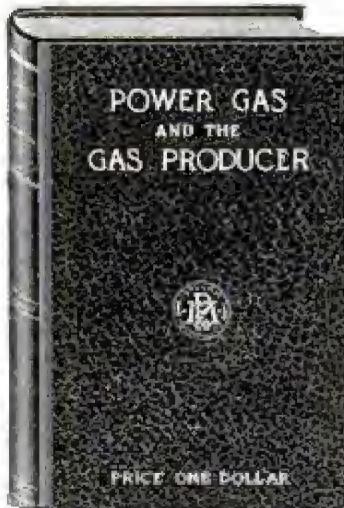
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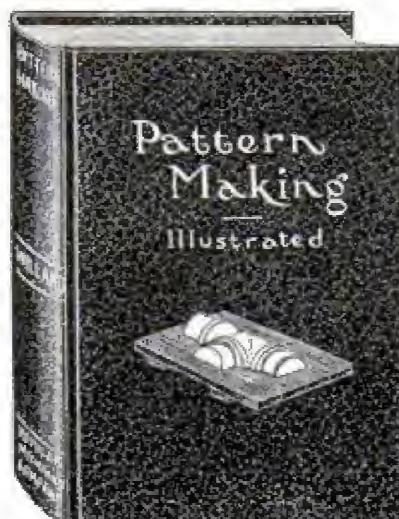
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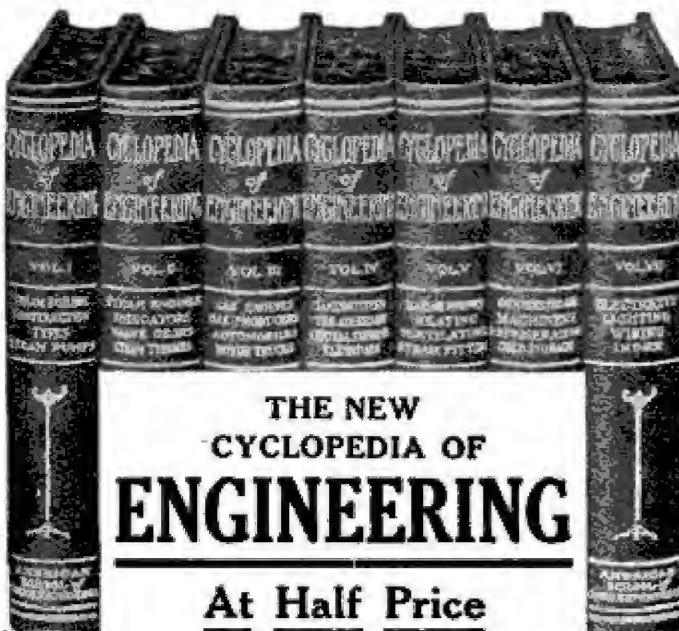
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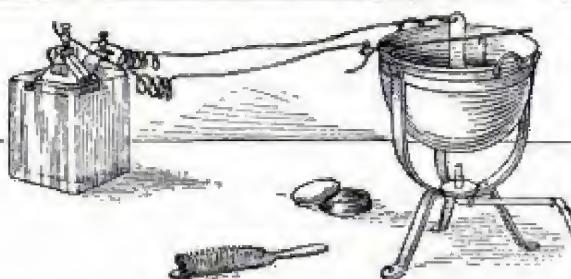
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"Cutting Keyways on a Lathe"

Second Prize—MISS MARGARET S. HUMPHREYVILLE,  
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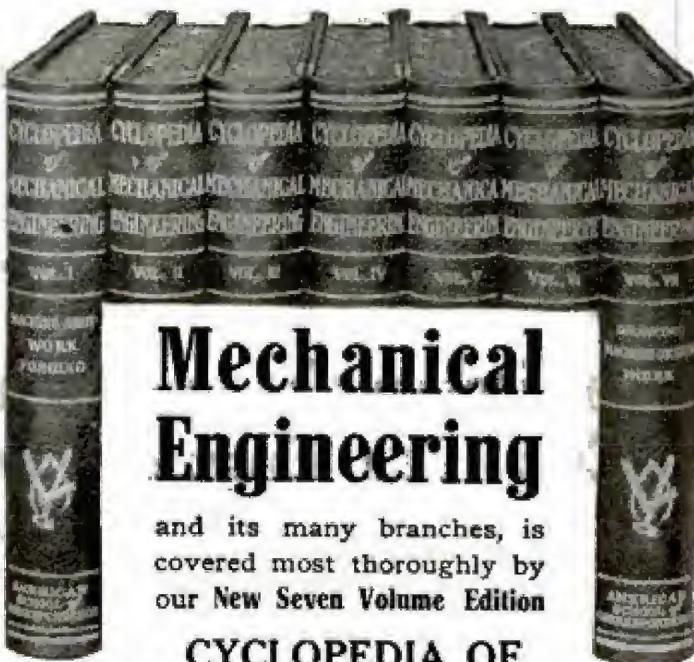
HARRY E. WELLS, Scottsburg, Ind. .... \$5  
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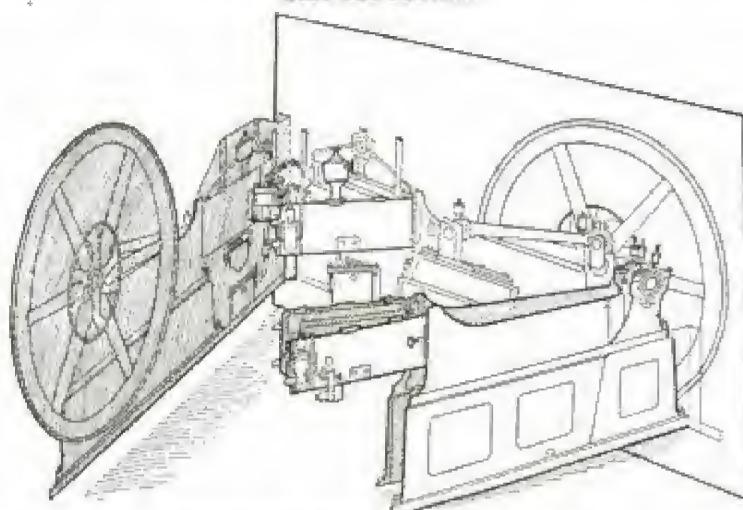


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**POSTCARDS—15c—100,** send 4c for samples. Seacoast Card Co., Box 865-P, Astbury Park, N. J.

**1 SAMPLE PACKAGE,** 10 assorted high grade postcards, birthday, best wishes, etc., 10c, no trash. F. W. Ackerman, Quincy, Ill.

**10 ELEGANT** Rate Virginia Views, all different, 10c; 30c. Good's Printery, Harrisonburg, Va.

**YOU'LL GET CARDS** from everywhere. Membership, 10c. Idaho Card Exchange, Dept. K, Box 906, Boise, Idaho.

**"FRENCH BEAUTIES."** Send 25c coin for 3 genuine photos. A. C. Warren, Box 291, Detroit, Mich.

**3 DIFFERENT VIEWS** of Porto Rico, 25c. L. Smith, 31 Calle Villa Ponce, Porto Rico.

**WONDERFUL NEW!** Rare pretty girls paintings, artistic, latest hits of Coney Island, 6 for 25c. Pioneer Novelty, 214 Prospect Park, Brooklyn, N. Y.

**FREE! FREE!** To advertise our Celebrated Photographic Goods, will give one Gem Camera and Complete Outfit to any one sending 35c to cover packing, mailing, etc. Wayside Supply Co., Everett, Mass., Dept. 10.

**IF YOU REALLY WANT** to exchange postcards, try our splendid club. Lists circulate in many countries. Membership, 10c. Halcyon Club, Box 133, Erie, Pa.

**PICTURE-POSTAL** from Guam, Uncle Sam's beautiful coconut isle. Send 10c coin. S. E. Braggins, Guam, Marianas.

**FREE!** 50 names of people all over U. S. who will exchange Postcards, to anyone sending dime for 6 Art Cards. W. Hale, Everett, Mass.

**MODEL OF PANAMA CANAL** in relief, \$1. Greenback or M. O., payable Cristobal, Canal Zone. Panama Souvenir Co., box 105, Colon, R. P.

**100 BEAUTIFUL NOVELTY POST CARD** Views. Your name in big mail and post card club and a bundle of mail postpaid for 10c. Coeur d'Alene Supply Co., Box 1641, Spokane, Wash.

**CAMERAS, PHOTO SUPPLIES, ETC.**

**DEVELOPING AND PRINTING**—Good work and no delays. No tank or machine-work done. Fifteen years' experience. John R. Smith, P. O. Box 343, Provincetown, Mass.

**MAKE PHOTOS CHEAP!** Get our catalog—Cameras, Supplies, Developing, Enlarging. Valuable exposure meter included. 10c. Rex Bromide Co., A, Lincoln Park Station, Chicago.

**AMATEUR PHOTOGRAPHERS** send us a film, we develop your first one free. Barbey's Art School, D 182, E. 2nd St., Oswego, New York.

**EVERY WORKER IN PHOTOGRAPHY** should read *The Camera*, \$1.00 a year. Send 25 cents for three months' trial subscription. *The Camera*, Philadelphia, Pa.

**ENLARGEMENTS FREE.** Films developed, 10c; prints, 3c. Photoelectric Shop, Rock Island, Ill.

**6 1/2x8 1/2 CAMERA**, \$6.00. 4x5, 5x7 cameras and outfit, \$10.00, \$12.00. Butts, Oxford, N. Y.

**WRITE US BEFORE YOU BUY.** Bargains or exchange in everything Optical and Photographic. Send for free catalogue and bargain list No. 15. Special: Achromatic Telescope, 3 draw, 10 power, post free, \$2.00. Kahn & Co., Established 1850, 26 John St., N. Y.

**PHOTOISMS**—A magazine that will appeal. Send 25c for 3 mos. subscription or \$1 for a year and a Wager Exposure Scale free. Photoisms, Advertising Dept., 196 Broadway, N. Y.

**FILMS DEVELOPED**, 10c per roll. All sizes. Prints: 2 1/4x3 1/4. 3c; 2 1/2x4 1/4, 3 1/4x4 1/4, 4c; 3 1/4x5 1/4 and 4x5, 5c. Prompt returns. Highest grade work. Send 2 negatives and will print free as sample. G. R. Hoke, 6206 Jefferson Ave., Chicago.

**FILMS DEVELOPED FREE;** printing, 50c dozen, all sizes. Don't write. Send 25c stamps with films. Klme the Kodak Publisher, 622½ Main St., Little Rock, Ark.

"CAMERA WORK for Profit," 25c. "Photography Self Taught," 25c. National Book Co., Collinwood, Ohio.

**66 2-5%** DISCOUNT. The \$1 popular book entitled, "The Selection of a Photographic Outfit," sacrificed at 33c; 10c extra for mailing. Order now before supply is exhausted. Willoughby, 814 Broadway, New York City.

**KODAK FILMS DEVELOPED**, 10c per roll, any size. Prompt attention given mail orders. Prints 2 1/4 x 3 1/4 to 3 1/4 x 4 1/4, 3c; 4 x 5 to 3 1/4 x 5 1/4, 4c. J. M. Manning, 1062 Third Ave., New York City.

**TRADE SCHOOLS**

**AUTO TIRE REPAIRING.** Learned in three to six weeks. A situation assured. An opportunity to get into a business of your own. Instruction in our factory shop. Very low tuition. Haywood Tire & Equipment Co., 530 N. Capitol Ave., Indianapolis, Indiana.

**LEARN PLUMBING, EARN \$5.00 A DAY.** We qualify you in four to six months by actual experience on new buildings, which feature of instruction cannot be obtained in other schools in the country. Tools furnished free. Tuition reduced. For particulars address Master Plumbers Trade School, 3057 Finney Ave., St. Louis, Mo.

**A COMPLETE COURSE** in Practical Automobile Engineering, under experienced instructors, with all modern equipment and appliances. Our four-story building offers special accommodation to out-of-town students. Call or write for our liberal proposition on Resident or Home Courses. Automobile School of Chicago, 1339 Michigan Ave., Dept. P. M.

**WANTED**—Men by large Contracting Co. \$20,000.00 contract work going. Can learn automobiles, electricity, plumbing, brick-laying trade in few months. No apprentices or helpers work and no expense. Catalogue free. United Trade School Contracting Co., Los Angeles.

**AUTOMOBILE SCHOOL.** You learn with your hands under the superintendence of the best instructors obtainable at the Chicago School of Motoring. Write for particulars. F. E. Edwards, Inst., Dept. "B.C.", 1619 Michigan Ave., Chicago, Ill.

**PLUMBING, ELECTRICITY, BRICKLAYING** or Mechanical Draughting, taught by expert workmen. Short time and small cost. Positions always open. Catalogue free. Write today. Coyne National Trade Schools, 30 E. Illinois St., Chicago.

**SLIDE RULE**, will help you solve problems. Circular sent. Geo. W. Richardson, 4218 24th Place, Chicago, Dept. S.

**BUSINESS OPPORTUNITIES**

**SMALL CAPITAL** will start new, independent business. Make \$5 to \$10 a day. The American razor honing and safety blade sharpening machines are money makers; they hone razors, sharpen all kinds of safety razor blades, clippers, scissors, etc. No previous experience required. For particulars address, Manager, Illinois Cutlery Co., Dept. 608, 184 Washington St., Chicago.

**CASH YOUR IDEAS!** If patentable and practical you can sell them or start a business on them; my clients make money on their patents. Send sketch for free opinion of merit and patentability; reliable dependable service. Book free. H. Sanders, Crilly Bldg., Chicago.

**START A MAIL ORDER BUSINESS** of your own. Be your own boss. I made \$25,000 in two years with small capital to start. My booklet "Money Making Opportunities in the Mail Order Business," sent free. Address, McKean, Dept. 275, No. 2232 Eighth Ave., New York.

**MAKE MORE MONEY!** Start a mail business; operate a "Silent Salesman" system; evenings; possibilities unlimited. The best money making plans are in "Booster." Get away from wage slavery! "Booster" starts you in business for yourself with small investment. Send 10c for two months' trial. Booster Magazine, Dept. W, 208 N. Fifth, Chicago.

**PATENTS SECURED**—C. L. Parker, ex-examiner Patent Office, 910 G St., Washington, D. C.

**WOULD YOU CARE** to make a moderate investment in a non-competitive business of a more far-reaching and wealth-creating nature than even Thomas Edison's inventions, although in an entirely different industry? If interested write for full information and references to F. B. Hart, care Popular Mechanics, 225 Washington St., Chicago, Ill.

**EARN \$10 TO \$15 A WEEK** and hold your position besides. No canvassing. We, as manufacturers of patented specialties, have New Easy Mail Order Plans to keep our factories busy. Large profits. Small capital. If you are one of the want-to-go ahead kind write for plans, sworn statement. J. M. Pease Mfg. Co., 5000 Pease Bldg., Buffalo, N. Y.

**MAKE "ONCE-A-WEEK" STOVE POLISH.** Applied to hot stove without burning. Gives lasting shine, cheapest to make, easiest to sell. Formula and directions, one dollar. Canadian Formula Bureau, Toronto.

**FREE—"INVESTING FOR PROFIT"** Magazine. Send me your name and I will mail you this magazine absolutely free. Before you invest a dollar anywhere, get this magazine—it is worth \$10 a copy to any man who intends to invest \$5 or more per month. Tells you how \$1,000 can grow to \$22,000. How to judge different classes of investments, the real power of your money. This magazine six months free, if you write today. H. L. Barber, Publisher, R 410, 20 Jackson Boulevard, Chicago.

**MAKE \$50.00 WEEKLY** in Mercantile Collection Business; capital and experience unnecessary; start during spare time and become independent; particulars free. E. W. Briggs Co., Washington, D. C.

**BIG MONEY AT AMUSEMENT PLACES** with device for testing batting strength; weight indicates home run, one, two or three base hit. Send for catalogue. Wm. Sullivan, Richmond Hill, N. Y.

**WANTED—RAILWAY MAIL CLERKS.** City Carriers, Post-office Clerks, Government Stenographers and Bookkeepers. Thousands of appointments coming. Average salary about \$1100. No "Layoffs." Short hours. Annual vacations. Common education sufficient. Political influence not needed. Send postal immediately for schedule showing places of coming examinations. Free coaching. Franklin Institute, Dept. J 83, Rochester, N. Y.

**CHICAGO FIRM WANTS RELIABLE MAN** as State Representative. Responsible man with few hundred dollars can positively clear \$150.00 monthly. We manufacture 350 varieties Highgrade Air Brush Design Show Cards. Peoples Show Card Concern, 752 W. Madison St., Chicago.

**A FEW GOOD STATES** left for first class sales agencies. Exclusive contract for distribution of the Victor Furnace Tender. Write now. V. E. Cosine, Gloversville, N. Y.

**I MADE \$50,000** in five years with a small mail order business; began with \$5. Send for free booklet. Tell how. Heathcock, Lockport, N. Y.

**I WILL HANDLE GENERAL AGENCY** for any good electrical or mechanical novelty, office supplies, etc. E. E. Clayton, Caixa Postal, 718, Rio de Janeiro, Brazil.

**MAIL ORDER ADS THAT PAY.** 20 different propositions fully explained. All bona-fide, sure-fire Money-getters. Each one the foundation of a successful Mail Order business. Send 10c for full particulars and regular bulletin of new propositions. Mail Dealers Wholesale House, 450 Franklin Bldg., Chicago, Ill.

**WANTED BY PITTSBURG MANUFACTURER**, few energetic salesmen to sell the leading high-grade specialty of U. S. Applicants must be high-grade salesmen. Hutchison Mfg. Co., 321 Wood St., Wilkinsburg, Pa.

**BIG PROFITS**—Open a dyeing and cleaning establishment, splendid field, very little capital needed. We teach a successful method by mail. Write for free booklet. Ben-Vonde System, Dept. C, Staunton, Va.

**1,000,000 CIRCULATION** for advertisers, rates 25c line. (\$3,000 redbordered gummed stickers, 95c.) Circulars mailed 20c, 100c, \$1.50, 1,000. Commission mailers wanted. Agents: electric lighters, 90c dozen. Kellner Advertising Agency, Louisville, Ky.

**FREE YOURSELF** from wage drudgery! 12 ways 10 cents. Bc. Money Back Store, Baltimore.

**WE START YOU** manufacturing article which brings 100% profit. No competition. Sample and particulars, 25c. Tallala Mfg. Co., Talladega, Ala.

**ABSOLUTELY ONLY CORRECT MAILING LIST** every American Fruit Grower's address ever compiled; limited number, type-written, offered (restricted) June 1. Invaluable. Never yet circularized. Apply, The American Fruit Union, Cincinnati, Ohio.

**BE YOUR OWN BOSS.** Start mail order business at home. Devote whole or spare time. We can tell you how; very good profits. Everything furnished. No catalog outfit proposition. For "starter" and free particulars address P. M. Krueger Co., 155 Washington St., Chicago, Ill.

**INCORPORATE** your patents and business under Arizona Laws. Cost very small. No annual or franchise tax. Members exempt from corporate debts. No public statements required. No restrictions. Hold meetings and do business anywhere. Charters cannot be repealed by subsequent laws. Particulars, laws and forms free. Southwestern Securities & Investment Co., Box 1488, Phoenix, Arizona.

**FORTUNES MADE MAILING CIRCULARS.** Plan and 25c sample, 10c. Other circulars mailed with ours reasonable. Results guaranteed. Mutual Benefit Club, 7114 Eggleston Ave., Chicago.

**TURN YOUR SPARE TIME** into money with our live, up-to-the-minute mail order plan; \$5 capital will start. Circulars with your imprint furnished. Profitable for man or woman. Particulars free. Stark Co., Whiting, Ind.

**LEARN THE SILVER PLATING BUSINESS** and be assured of a good living for life. Simple instructions. Write for free descriptive pamphlet. Humboldt Publishing Co., 4743 State St., Chicago, Ill.

**CASH FOR FORMULAS,** processes, ideas, trade secrets. Steady, profitable home business. Instructive booklet free. Information System, 246, Marietta, Ohio.

**MR. MANUFACTURER OR MECHANIC,** here's your opportunity to possess reprints of valuable collection of trade secrets, shop formulas of old Southern Chemist; embracing several hundred useful subjects as Gas Mantles, "Swiss" Maple Flavor, "Solar" Liquid Metal Polish, "Solv" Paint Remover, Artificial Rubber, Liquid "Ham Smoke," Yale's Toilet Specialties. Some new, others to use for years safely guarded, making owners independent. Introductory offer \$1.00. Don't judge this proposition by the low price. I can furnish strictly reliable formulas for anything. Write me your wishes. Liscorn Miller, Erek Chemical Co., Marietta, Ga.

**FOR SALE—American Brass & Aluminum Works, Indianapolis, Indiana.** Thoroughly modern in equipment. Last year's business nearly \$200,000.00. Second largest Automobile center in United States. Nearly thirty Auto factories in city and vicinity. Other industries here and within radius of one hundred miles require large quantities of Brass castings. Have parties who will take half interest in a reorganization who are the best qualified and who have had the longest practical experience in the manufacture of Aluminum castings in the United States. Present owner engaged in other business requiring his time. Address F. E. Janes, Pres., care F. E. Janes Coal & Grain Company, Indianapolis, Indiana.

**CONCERN DOING A LARGE BUSINESS** in bronze marine goods desires to acquire patents or manufacturing rights to a suitable article which can be marketed during the fall and winter. Equipment comprises well equipped brass foundry, machine shop and polishing room. Location near New York. Address, L. J. Hall, Freeport, Nassau County, New York.

**MUSHROOMS—NEW PURE TISSUE culture summer spawn.** Now is the time, plant this new spawn; produces big crop white mushrooms all summer. Four other varieties winter planting: modern plan forcing plants, mushrooms, early quick crop. Book free. Fresh sample brick, 35c postpaid. We are originators and manufacturers of pure tissue culture mushroom spawn. Order direct from laboratory. Challenge Farm, 6961 Gravois Ave., St. Louis, Mo.

**MAKE MIRRORS AT HOME.** Big profits with little outlay. One 1x36-in. mirror costs \$2 to \$5. You can silver a glass this size for 20c. Send \$1 in stamps or money order and we will send you explicit directions how to do it; also how to emboss, grind, foil, gold leaf, frost, etch and make imitation stained glass. How to transfer photos on glass, bore holes in glass and cut skylights. George L. Patterson & Co., Dept. 3, Brooksville, Ky.

**BUILD A BUSINESS** of your own and escape salaried drudgery for life. Learn the Collection Business. Limitless field; little competition. Few opportunities so profitable. Send for "Pointers" today. American Collection Service, 101 State St., Detroit, Mich.

**I WILL START YOU** earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. P. Redmond, Dept. 306, Boston, Mass.

**LEARN THE TRUTH** about Mail Order Business before buying "outfits." Important information and particulars for starting free. Mail Order Library, P. M., Tompkinsville, New York City.

**HAVE YOU ANYTHING TO ADVERTISE?** Our Rate Book tells you all about advertising mediums, rates, circulation, closing dates, etc. Sent for 10c. Worth dollars. Folder free. Correspondence invited. Dearborn Advertising Agency, 455 Franklin Bldg., Chicago.

**FORM A CORPORATION**—Congress Law for D. C. and all States: cheap. Raise money easily; advice free. U. S. Legal Corporation, Washington, D. C. Representing \$1,225,000,000.

**POSITIVELY BEST RIBBONS,** three, \$1.10. See what I say under "Typewriters." Atchison.

#### AGENTS WANTED

**WEAR A STYLISH SUIT!** Clothes make the man. The man who is admired is the swell-dressed man whose clothes are fashionable, and are 1911 styles. You will be that man in your neighborhood! 1911 styles are just in. Get this suit—the swellest, classiest, snappiest style we ever created, and better your appearance! This is our idea: We want one man as our representative in your neighborhood. You've got a lot of friends. They wear clothes. It is the easiest thing in the world to get them to order their clothes from you. Prices, \$7.50 and up. These orders mean a big business that more than doubles your salary, and the work is the easiest, cleanest, neatest occupation in the world. New representatives make \$5 to \$10 a day. You simply take the order and measurements and mail them to us. We make the clothes, ship them on approval to your friend and hand you the profit money. A Regular Clinch! That's the beauty of being in business for yourself. Sit right down now; write us a postal or a letter for the free outfit to representatives. And you get the swellest suit of fashionable, tailor-made, all-wool, 1911 clothes ever worn in your neighborhood. If your personal appearance and a big business is worth a postal or a 2-cent stamp to you, then act now—write us today. Address, American Woolen Mills Co., Dept. 468, Chicago.

**A LARGE MANUFACTURER** of Vacuum Cleaners wants exclusive representative in each County. Only men of ability considered. Men now selling Vacuum Cleaners preferred. Our proposition should give the right man an income of \$300.00 per month the year around. This machine is operated with ease by one person and sells for \$10.00 under factory guarantee. Sample machine shipped you for inspection without remittance. The Graham Manufacturing Co., X 10, Cincinnati, Ohio.

**AGENTS—Secure the Hill Lock Valve Agency in your community.** A patented lock valve which effectually prevents, when locked and key removed, gasoline flowing to carburetor, consequently engine cannot be started. A sale can be made to almost every automobile or motor boat user. Tremendous profits. Hill Lock Valve, Room 229 Newfield Building, Bridgeport, Conn.

**AMAZING INVENTION—Entirely new lamp burner.** Changes ordinary kerosene illumination into beautiful large white gas light. Guaranteed smokeless, odorless. Not a mantle. Can't break. Unlike others. Brings you quick sales, large profits. Show ten, sell nine. Only 35c retail. This territory just opened. Act now. "Radiolite," 364 Colonnade, Toledo, Ohio.

**LIVE AGENTS WANTED.** High class proposition. "Koeth Kombination Kit," 15 tools in one. High grade tool steel. Fully guaranteed. Exclusive territory. Wonderful seller. Every Auto owner buys on sight. One agent made \$10.00 in two hours. Currier-Koeth Mfg. Co., 37 West St., Connersport, Pa.

**BE YOUR OWN BOSS.** Sell "Modern" Self-heating Irons. Iron Stands and "Modern-Make-Milwaukee" household specialties. 100% profit. 10c brings Burglar Lock. We manufacture, advertise; you sell. Our agents become independent and own their business. Write at once for New Spring Catalogue "P." Exclusive proposition. Modern Specialties Mfg. Co., Milwaukee, Wisconsin.

**AGENTS.** \$100 weekly, selling ready made air brush show cards to merchants. 339 varieties 11x14, two colors. Can start mail order business. Write for catalog, sample and circular Art of Sign Painting. Popular Show Card Co., Desk AM, 1235 Michigan Ave., Chicago.

**WANTED AGENTS EVERYWHERE** for Duplexo Vacuum Cleaner. Only perfect hand machine. Double Suction, weighs 6 lbs., cleans carpets, floors, curtains, furniture. A wonder. Can't get out of order. A child can use it. Demonstration means a sale. Big profits. High class permanent business. Write for particulars to the Duplexo Co., Dept. F, 35 So. 5th St., Brooklyn, New York.

**AGENTS WANTED IN EVERY TOWN** and county to handle the most practical vacuum sweeper ever put on the market, sells for \$5. Weighs 6 lbs. Hustlers make big money; demonstration means sale. Operated by one person. If interested send for sample. Get the town or county you want and get busy. Don't wait till the other fellow gets ahead of you. W. H. Heddings Co., York, Pa.

**AGENTS**—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profit; sales driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for \$3.50 and saves the purchaser an investment of \$25. Write for particulars. The Handy Light Co., 211 Opera Place, Cincinnati, Ohio.

**REPRESENT US EXCLUSIVELY** in your territory. Build up permanent business by repeat orders. We, as manufacturers of patented household necessities want "I will" men on our co-operative plan. If your letter indicates that you mean business we will outline our plan. J. M. Pease Mfg. Co., Co-Operative Dept., 4004, Buffalo, N. Y.

**AGENTS—BIG MONEY** selling gold and silver glass window novelty and changeable signs; illustrated catalogue. Climax Novelty Co., Gay Bldg., St. Louis.

**AGENTS:** Send for free booklet, Inside Information on the agency business. Filled with money making plans. Pointers and experience of thousands of successful agents. Address, J. M. Finch, 1163 3rd St., Dayton, Ohio.

**AGENTS—Biggest money-maker known.** The new Canchester Incandescent Kerosene Lamp revolutionizes old lighting methods. Burns air, not money. Six times brighter than electricity, gas or acetylene at 1-10th cost. Burns with or without mantle. Burner fits any lamp. Saves 75% oil. No trimming wicks. Showing means selling. Territory going fast. Write today. Handsome outfit furnished. Canchester Light Co., Dept. P. M. 6, 204 No. State St., Chicago.

**LIVE AGENTS WANTED—HUSTLERS** to handle our attractive 1911 combination packages of soap and toilet articles with valuable premiums. One Michigan agent made \$65 in 47 hrs.; another \$21 in 8 hrs.; another \$22.50 in 10 hrs. Write today. Davis Soap Works, 264 Davis Building, 1429 Carroll Ave., Chicago.

**SCRIBNER'S MAGAZINE SUBSCRIPTION SOLICITORS** easily earn liberal commissions and also can pick up extra prize money by persistent work. For full particulars regarding commissions, prizes, free advertising matter, sample copies, etc., address Desk 81, 155 Fifth Ave., New York City.

**AGENTS—Quit peddling!** Do it by mail. Your spare time worth \$25 weekly. Investigate our unique mail business. Amazing profits for shrewd people. Write for details. Fredericks & Co., 176 Unity Bldg., Chicago.

**MATCHLESS CIGAR LIGHTER.** Agents: live wire proposition. Just out; pocket cigar lighter shaped like fountain pen. Sells at sight. Sample 15c. Schiller Mfg. Co., Inventors, Dept. B, Schiller Bldg., Chicago.

**AGENTS—Sell aluminum egg separators.** 100% profit, sample 10c, round aluminum roaster, 10 inches diameter, 5 inches deep, sample 98c. Texas Aluminum Co., Desk E, Box 532, Chicago.

**AGENTS WANTED**—Our new spark gas lighter dispenses with matches. Sample, postpaid, 12 cents. Simmond Mfg. Co., 514 W. 154th St., New York.

**BOYS AND GIRLS WANTED** to sell Jewelry, Mending Tissue, Thimbles or Postcards. When you sell 24 packages at 10c each you get Camera or Watch free. Send now. Roxbury Card Co., Dept. 5, Roxbury, Mass.

**AGENT OR MACHINIST**—Send postal with your address for most important information that concerns your interest. Albert Alba, 302 West 54th St., New York City.

**AGENTS FOR PROFITABLE OFFICE ARTICLE.** Good side income for bookkeepers. F. A. Marble, Rockville, Conn.

**AGENTS—Portraits, 25c; frames, 15c; sheet pictures, 1c; stereoscopes, 25c; views, 1c.** 30 days' credit. Samples and catalog free. Consolidated Portrait, Dept. 119X, 1027 W. Adams St., Chicago.

**EARN A SUIT IN ONE HOUR!** Your profit for an hour or two as the representative of our great tailoring house pays for a special made-to-measure suit for you—the handsomest, the most stylish and the most durable ever made. Just show two or three of your friends the samples of our fine wool suitings, take two or three orders and you have earned the suit. You can't fail to get orders. Our 60 beautiful samples create a sensation wherever shown. No one ever saw such materials at the price before. You take no risk. Everything is shipped on approval, subject to 24 hours' examination. Customers try goods on and must be satisfied with style, fit and quality before paying. We pay express on everything. You can undersell everybody. Get clothes for your friends at less cost than they pay anywhere else and make wholesaler's, jobber's and retail dealer's profits. That means the sweetest, cleanest and neatest business in America! A Big Business that more than doubles your earnings. We want you to represent us now. Don't wait until somebody else takes this great business. No experience necessary. We furnish you our portfolio with 60 samples of the latest weaves, fabrics and colors, absolutely free. Do you want this swell made-to-order suit and this remarkably easy money-making business that will make you rich? A postal or letter mailed to us at once gives you swell clothes and a big business. Write us now. A postal card will do. Or tell your friends about it. Paragon Tailoring Company, Dept. 11, Chicago, Ill.

**AGENTS—WE MANUFACTURE GLASS PAPER.** Plain glass windows made to look like real stain glass; something new; easily applied; big money maker; two sample sheets of paper, with catalogue in colors and discount sheet, for 10c. S. H. Parrish & Co., 202 S. Clark St., Chicago.

\$50 MONTHLY to trustworthy people to distribute samples and catalogues at home. Steady work \$45 expense allowance. S. Scheffer, Treas., M. Q. Chicago.

**AGENTS—Send for free sample Surridge's Holditite Patches for repairing Inner Tubes.** 55 East Walnut, Pasadena, Cal.

**EXCLUSIVE TERRITORY GIVEN** to agents who demonstrate they can sell the best gasoline sad iron manufactured. Sample at reduced rates. Herz Mfg. Co., Jackson St., St. Paul, Minn.

**RAINFOATS—"FROM MAKER TO WEAVER."** at manfrs. prices. Write for particulars and samples. Agents wanted. Regal Raincoat Co., Dept. 69, 1367 Broadway, New York.

**COUNTY AGENTS** for the only five year guaranteed Vacuum Cleaner made; sells \$14; business pays for itself out of profits; no canvassing; free trial; write today. Hercules Cleaner Co., Rochester, N. Y.

**PERFECTION POCKET ADDING MACHINE.** Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R, Cincinnati, Ohio.

**AGENTS WANTED** to sell our beautiful scripture wall mottoes. Frank Shilling Co., Navarre, Ohio.

**FAIRY-DELL PERUFMES** blended from California's sweetest flowers; a bottle by mail 10c siver. Agents wanted. Tropical Perfume Co., 322 S. Spring St., Los Angeles, Cal.

**ANY LIVE AGENT CAN** make 100% profit working for us. New article, sells for 25c, universal demand, exclusive territory, quick sales. Send now for free sample and terms. The G. V. Sales Co., 150 Nassau St., New York, Room 1825.

**AGENTS—Either sex** to represent us in every town in Wisconsin and Northern Michigan. Permanent business assured. Becher Specialty Co., 836 Becher St., Milwaukee, Wis.

**WE WANT AN AGENT** in every factory for our goods. Fast selling article, good profit, used daily. Worcester Chemical Co., 642 Pleasant St., Worcester, Mass.

**LATEST NOVELTY.** All merchants interested. Two dollars commission on twelve dollars sale. Send 50c to cover cost of sample. Western Sales Agency, 205 Byers Ave., Joplin, Mo.

**THE LEWDAL COMPANY,** West Somerville, Mass., manufacture a most wonderful Scalp Food and Skin Beautifier. They offer reliable agents, either sex, a splendid opportunity. Cooperative plan and continued premiums.

**AUTO SALESMEN, CHAUFFEURS—** Make big money. Sell our loud, simple, reliable "Samson" Electric Horn. Special offer to agents. Write quick to A. R. Cook, Agency Supt., American Electric Company, State and 68th Sts., Chicago, Ill.

**CLARK'S FLY EXIT** at top of screen lets flies out. They can't return. Postpaid, 25c. Agents wanted. Dr. L. W. Clark, Carterville, Mo.

**SMALLEST ALARM CLOCK,** Bible and telescope, 10c each prepaid. W. H. Garner, A-119 South Lafayette St., Evansville, Indiana.

**SELF-THREADING NEEDLES.** 10c a paper. Agents wanted, samples and terms free. Ladies' Art Co., Dept. 41, St. Louis, Missouri.

**AGENTS—Iceless Refrigerator,** tremendous seller; everybody buys; retails at \$4.50; territory given. Write today. Iceless Refrigerator Co., 120 Main St., Prairie Depot, Ohio.

**AGENTS, WOODWORKERS OR HANDY MEN** why not start a business of your own, easily manufactured—biggest seller out. Every family a customer. The "Folding Climax Iron stand," best ever invented. Full instructions and patterns only one dollar; wake up and get busy; send for circular. N. Scholl, Chillicothe, Ohio.

**AGENTS—Write for free samples and catalog of fastest selling household specialties; quick sales; big profits; don't delay, write now.** E. Gruber & Co., Stanwood, Iowa.

**\$1000 FOR THREE MONTHS' work.** We pay this if you are a salesman well and favorably known in your community and can devote part of your time. Address Kinsey & Rideout, 263 Wilcox Building, Los Angeles, Cal.

**AGENTS WANTED—Thirty-eight best selling household articles.** Big profits. Write for catalog. Davenport Merchandise Company, Davenport, Iowa.

**WE ARE MANUFACTURERS** of New Highgrade Original Air Brush Design Show Cards. Every storekeeper buys. 400% profit. Catalog containing 350 varieties free. Samples 10c. Peoples Show Card Concern, 750 W. Madison St., Chicago, Ill.

\$50.00 A WEEK is better than your present income. It is no harder to earn. We want men and women, aggressive, hard workers, as sales agents for the best selling specialty on market; nationally advertised, perpetual seller, fully guaranteed. Household necessity for town and country. New invention, large profits and special prizes. Write for territory. The Progress Company, 101 Progress Bldg., Chicago, Ill.

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**CASH FOR NAMES, IDEAS, INFORMATION.** Steady, profitable home business. Instructive booklet free. Information System, 247, Marietta, Ohio.

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**PERFECTION CIGAR BOX COVER AND PRICE CARD HOLDERS.** Big profits. Wonderful seller. Sample dozen, 20c. Michigan Novelty Co., Detroit.

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**AGENTS—Union Brand Hand Soap** for mechanics, in attractive cans, retails 10c. Profit 100%. 1146 Harrison Ave., Boston, Massachusetts.

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**BOKARA DIAMONDS—** Agents, everyone to wear and sell our famous Bokara diamonds. Write for sample offer and catalogue free. Northwestern Jewelry Co., 52 Northwestern Bldg., Chicago.

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**EARN \$25 TO \$50 WEEKLY,** spare time; no canvassing; repeat orders; sample 10c; write now. Berner, 333 Washington St., Boston, Mass.

**AGENTS—Over 500% profit.** Gold sign letters; sell everywhere; sample free. Johnston Co., Quincy, Ill.

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**AGENTS—To sell new automatic device;** big profits; unworked field. Write today for our profitable offer. Superior Wrench Co., Box 427, Marshalltown, Iowa.

**SEVEN-IN-ONE** New Novelty in jewelry. Scarf pin each day of week. Seven superb imported stones, match any color tie. Agents wanted. Exclusive territory. Investigate. Weeks, 2344, Boston, Mass.

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**AGENTS**—\$50 weekly; we manufacture the best needle case made; a wonderful seller; 200 to 500 per cent profit; talking unnecessary; our copyrighted "Trust Scheme" Envelopes do the work; general agents can make over \$100 weekly; send 10c for a 25c sample containing 115 needles; particulars free; buy direct from the factory at wholesale. Fatty Needle Co., 102 Union St., Somerville, Mass.

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**WANTED LIVE AGENT** in each locality for high class guaranteed line of paints. Commission basis. The Colorcraft Co., Cleveland, Ohio.

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**\$3,000 TO \$10,000 YEARLY** in the real estate business, without capital; we will teach you the business by mail, appoint you special representative in your locality, of leading real estate company, list with you readily salable properties, co-operate with and assist you to permanent success; a thorough commercial law course free to representatives. If you are honest and ambitious, our free 62-page book will surely interest you. Address International Realty Corp., Dept. J-21, Chicago, Ill.

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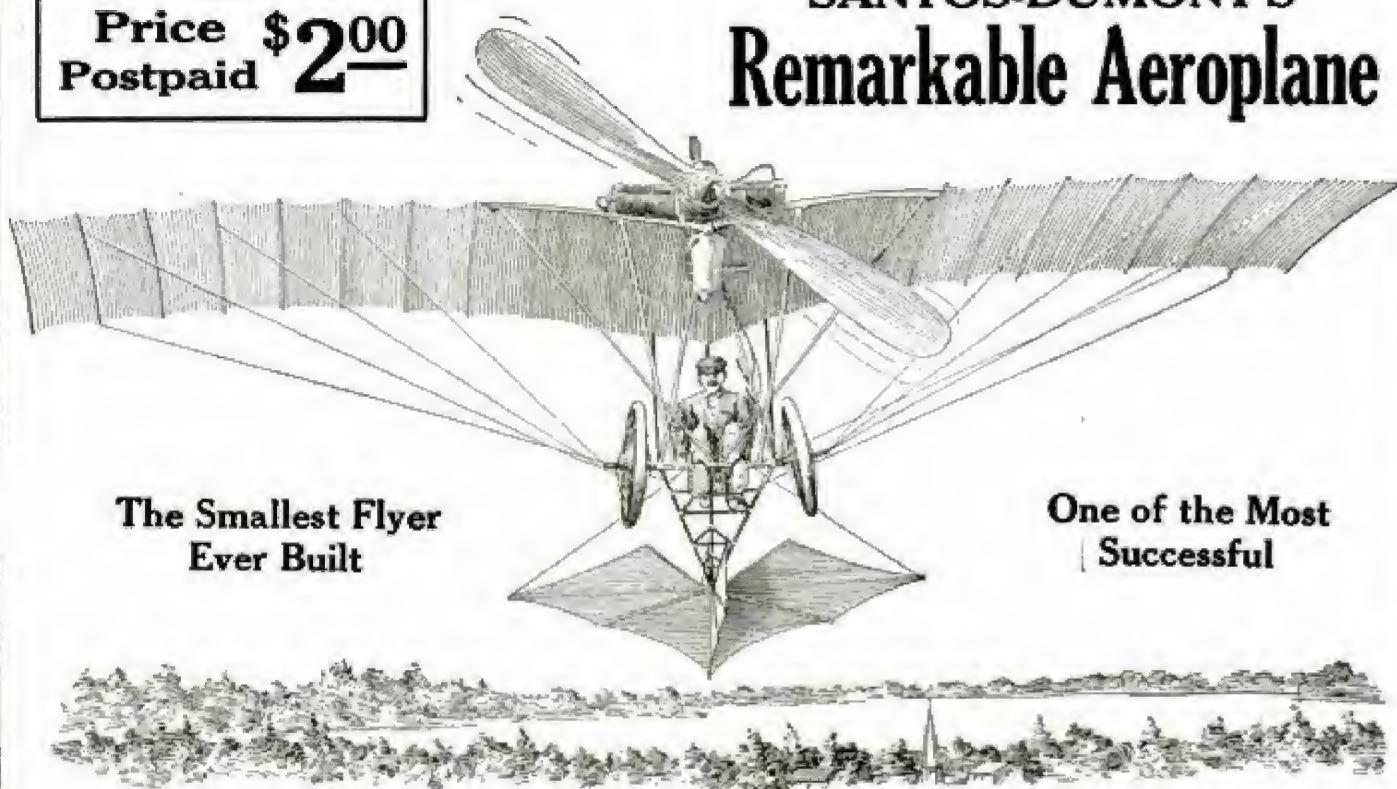
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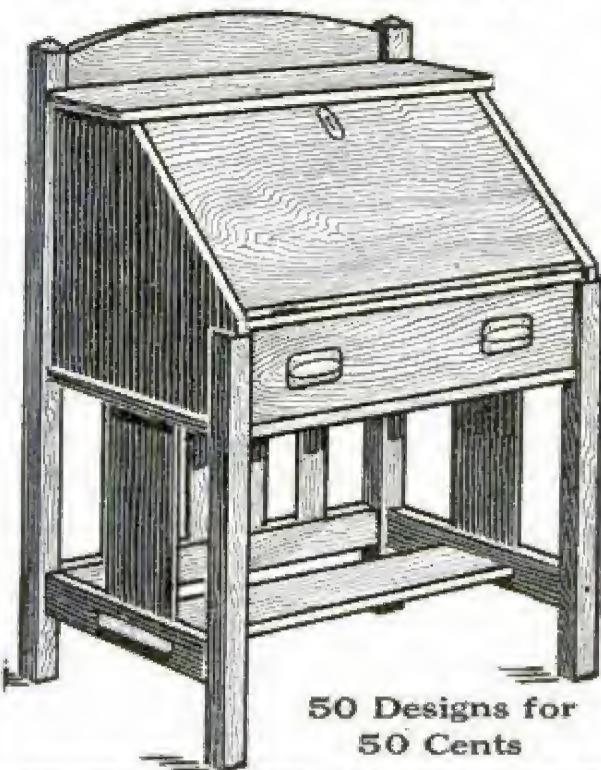
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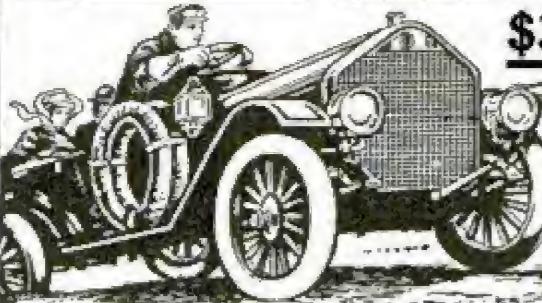
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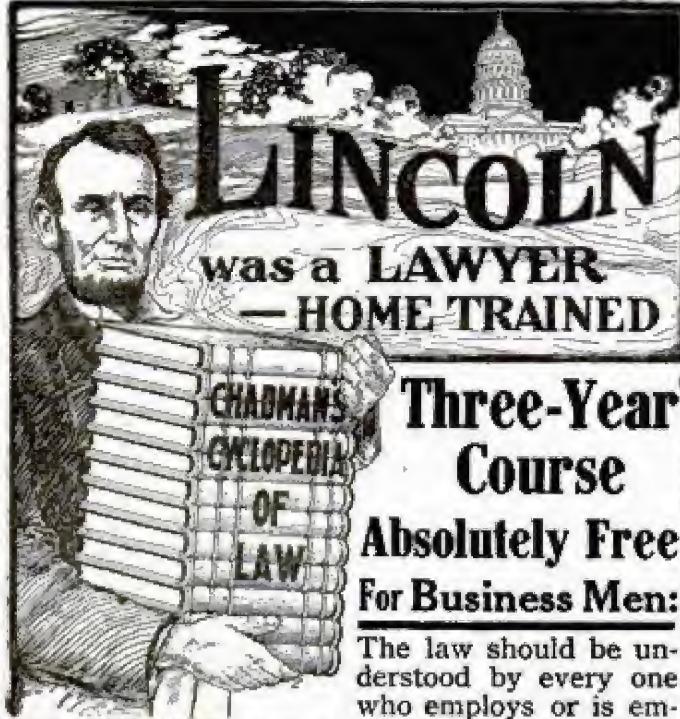
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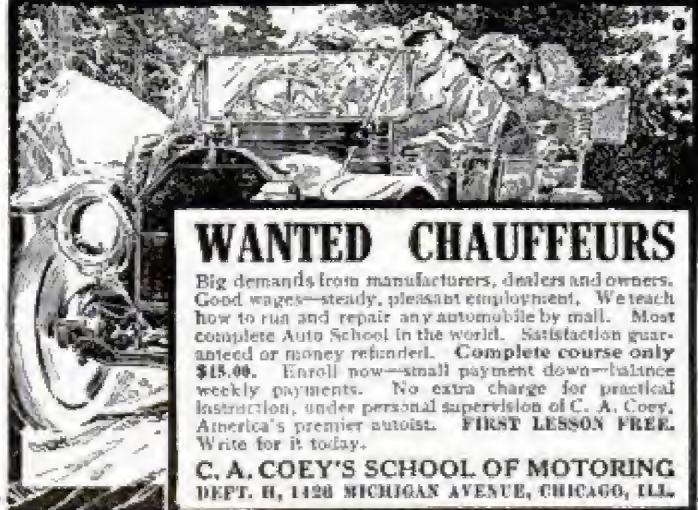
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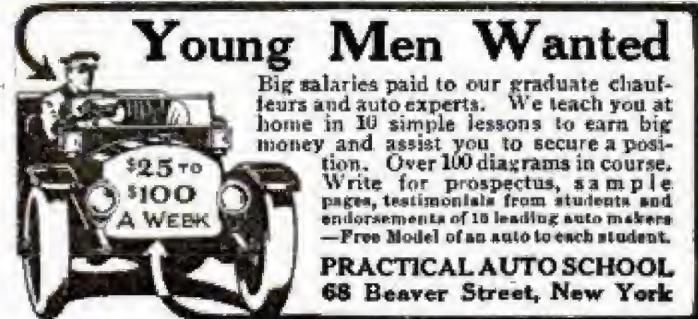
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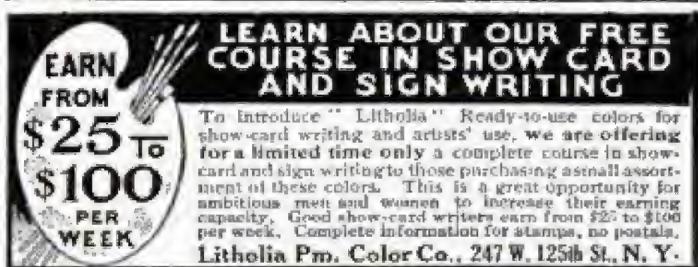
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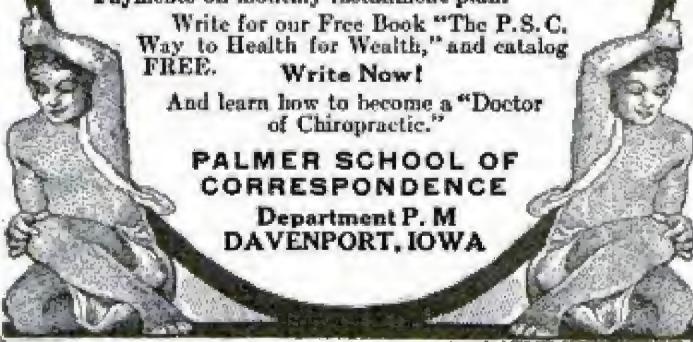
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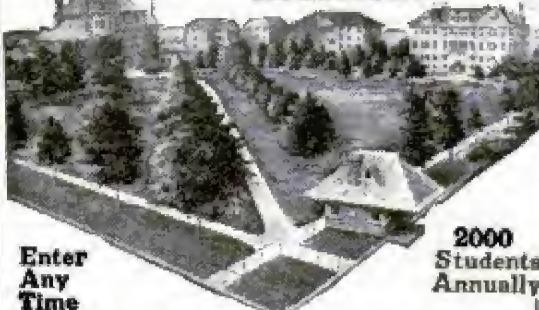
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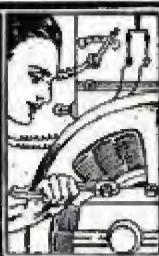
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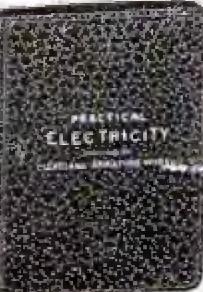
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# Popular Mechanics Magazine

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 15

JUNE, 1911

No. 6

## TEN TONS OF BREAD FOR TWENTY THOUSAND MEN

By FLORENCE FULLER



Pies, Doughnuts and Pastry Cooked in the New Army Oven

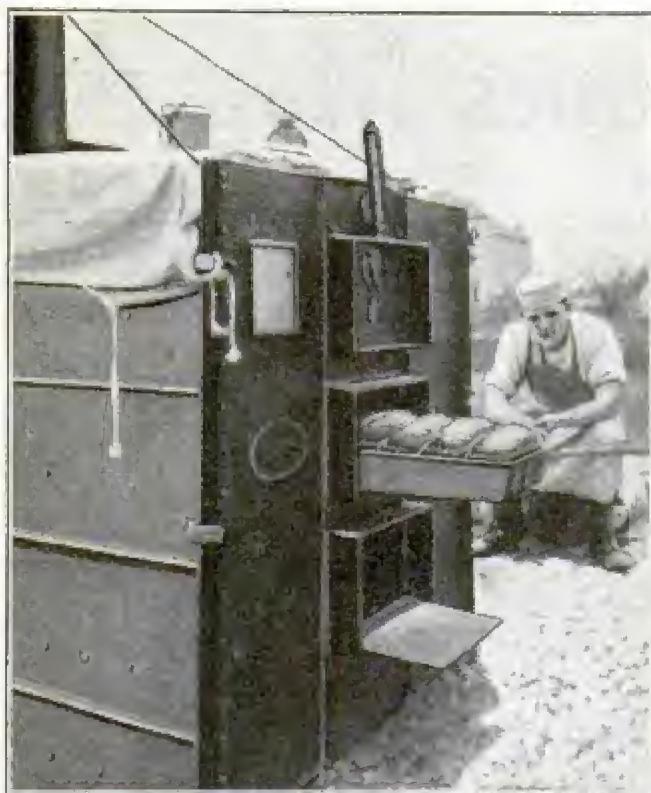
YEARS of study and experiment have enabled the experts of the War Department to perfect a field bakery equipment for the army that is claimed to be the best of its kind in the world. At San Antonio, Texas, in the big military camp, the 12 huge ovens that stand out in the open



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Front View of the Army Field Bakery Oven



Rear View of Army Oven Showing the Fire Box

never fail to remark its wonderful work in discussing the camp and its features. The big ovens stand 12 in a row and on either side of them is a line of tents in some of which the materials are kept, in others the sponges are set, the dough "proved," or let rise, kneaded, and made into loaves, and in still others the bread is cooled and kept on racks of wire netting.

All this equipment, including the oven, is collapsible, and each unit, consisting of the two tents, one oven, the necessary sponge cans, dough troughs, kneading tables, bread racks, etc., may be folded or telescoped and packed on one wagon, the total weight falling under 3,000 lb.

The Army Field Bake Oven No. 1 is constructed entirely of sheet iron and asbestos, measuring 4 ft. 8 in. high, 4 ft. wide and 5 ft. long at the outside of the base, being 3 in. smaller at the top. The top is covered with sand or gravel and a canvas cover. It is fitted with a pyrometer and a clock. The fire is built in a brick-lined pit, over which the oven stands, and it is attended to from the rear. Any fuel may be used.

A curved trench cover of sheet-iron and asbestos radiates the heat, which

is conducted by drafts upward and around the three baking chambers, which are separated by 4-in. flues. The baking chambers, built somewhat narrower in the center than at the ends, are made of an inner sheet of heavy iron, and an outer of lighter iron. At the corners, where the heat is most intense, these are packed with 14 sheets of  $\frac{1}{16}$ -in. asbestos, so graduated in length that toward the center they taper down to nothing, and there are a few inches where there is no packing. Thus an even heat is secured throughout. It requires only 20 minutes to heat each oven ready to bake. The baking capacity is 216 lb. per oven.

The field bakery is conducted on strictly scientific principles. The sponges are set in the big sponge-cans every 20 minutes, and an average temperature of 80 deg. Fahrenheit is maintained. To every 100 lb. of flour there is added 20 oz. each of salt, sugar, and lard, and 4 oz. of compressed yeast. If compressed yeast is not at hand, dry yeast is used, and if that is unavailable, the army bakers make their own yeast. Baking has been carried on successfully with these ovens during long heavy rains, and when the temperature was  $20^{\circ}$  below zero.



Side View of Pneumatic Boxing Glove, Showing Finger Closing

Inflating the Glove before a Bout  
Appearance of the Glove DeflatedThe Glove as It Appears When  
It is Inflated

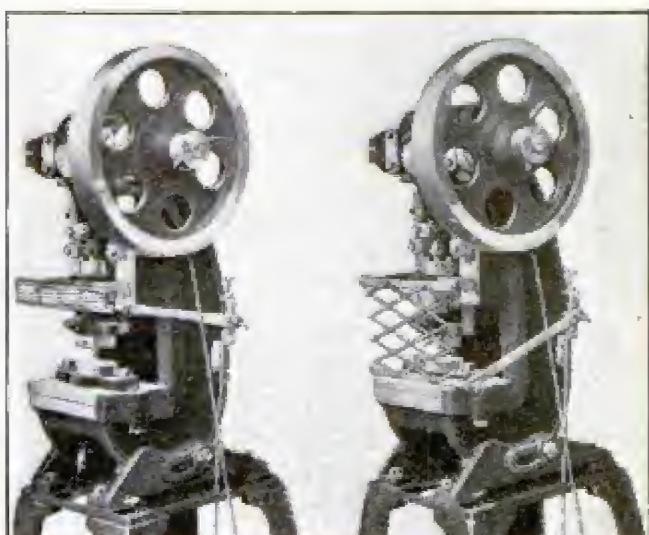
## PUTS AN AIR CUSHION ON SHORT-ARM JABS

A Philadelphian has invented a pneumatic boxing glove that some experts believe will cause the old "pillow" type to be discarded. The inventor, a trainer of pugilists and fight referee, evolved the new glove from his many years' experience in the prize ring. He was spurred to the realization of his idea of a perfect glove by reason of the fact that in training it was desirable to avoid injuries, and the old padded

glove, no matter how carefully it was used, was never a sure protection. With the pneumatic glove, with its cushion of air it is impossible to cut or bruise an opponent in boxing practice. For this reason the glove would seem to be a good thing for gymnasiums and for all friendly bouts where it is the object of the opponents to score points without hurting each other.

## INGENIOUS SAFETY DEVICE FOR MACHINES

Guards for running parts of machines are common enough, but a safety device that automatically drops into place to prevent possible accidents to machine operators while the piece of work is being shaped is an innovation. Such is the character of the safety appliance shown herewith. It consists of an extensible or folding gate on the "lazy-tongs" principle, which drops down in front of the work when the foot treadle is depressed to start the machine. When the machine stops, the gate folds up again, leaving the



Guard Folded Up Out of the Way When Machine is Stopped

The Safety Guard in Place with the Machine in Operation

work accessible for removal or adjustment. The work is plainly visible at all times, and the gate does not interfere with the rapidity of the operator.

### SHADOW DANCE IS LATEST THEATER NOVELTY

A London theatrical manager has achieved more than a day's fame by the presentation of a series of dances, old



**Shadow Dancer Who Performs behind a Screen, Only the Outline of Her Figure Being Visible to the Audience**

in their form, but entirely new in their method of production. The entertainment is called "shadow dancing" and consists of a very graceful young woman, draped only in diaphanous fabric, performing a dance of classic movements behind a white curtain, a strong light being thrown on the curtain and only the shadow of the dancer's figure being seen by the audience. Shadow pictures originated back in the stone age when the first

loving father doubled up his fists and showed his joyous offspring the picture of the rabbit formed by the shadow his hands cast when held between the side of his cave and the pine torch that gave him light. Persons with nimble fingers have introduced the same form of amusement in vaudeville, performing behind small screens. But the London instance is the first time that the entire figure has been used in a production and it is stated that the results obtained were exceedingly pleasing. The dancer became famous throughout London and all Europe for her graceful postures and novel way of presenting them.

### LEHIGH VALLEY RAILROAD DATES ITS CROSS TIES

The Lehigh Valley Railroad has adopted a plan by which it will be able to determine, with mathematical accuracy, the relative efficiency of the different woods of which its new cross ties are composed, and the value of the creosote preservation treatment. In each new tie put down will be driven a nail, on the head of which will be stamped a numeral indicating the year. The numeral "11," for example, will indicate that the tie was laid in 1911. In the future when a tie has to be replaced, the date stamp will show just how long it lasted.

### A CABINET KITCHEN THAT LOOKS LIKE A DESK

In these days of labor-saving machinery there has been developed, with disappearing furniture and small apartments, what might be termed a system of "intensive" living, bearing the same relation to the old-fashioned home life in a two-story, eight-room house that the old system of cultivating 100 acres of land bears to the work of the intensive farmer on his two acres. Intensive living has begotten many labor-saving devices, one of the newest of which is a cabinet kitchen which might make an ornament for a living



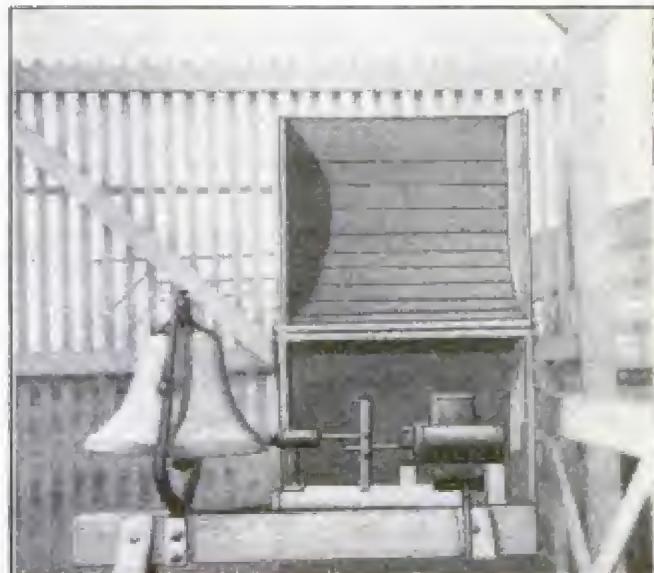
Not a Desk nor a Folding Bed, but a Cabinet Kitchen Designed for Use in Small Apartments

room when not on duty preparing the meals of the family. The cabinet, closed, resembles a desk and may be constructed with a mission finish that will add to this feature. Open, it provides the housewife with a kitchen and dining table, a china closet and space for storage of small groceries in the upper portion, while below are cupboards for pots and pans and the storage of more bulky articles of food. The side of the cabinet is opened, and on a slide that pulls out is found a two-burner oil or gas stove with an oven, if desired, and space on the stove to keep the larger pots and pans when not in use. The cabinet is mounted on casters and may be placed anywhere in the house.

#### FOG BELL RUNG BY WATER METER

A fog bell rung by a water meter is the interesting method adopted in connection with the ferry system at San Diego, Cal., to do away with the expense of keeping a man on the wharf to ring the bell in times of fog. The apparatus consists simply of an old water meter with a piston attached to its plunger so as to strike against the bell at regular intervals of about six seconds. When a fog comes on—an infrequent happening in the locality—all that is necessary is that a deck hand

go ashore and turn the valve on the water pipe, and the water does the rest. The amount of water wasted is nominal, and the device is considered both



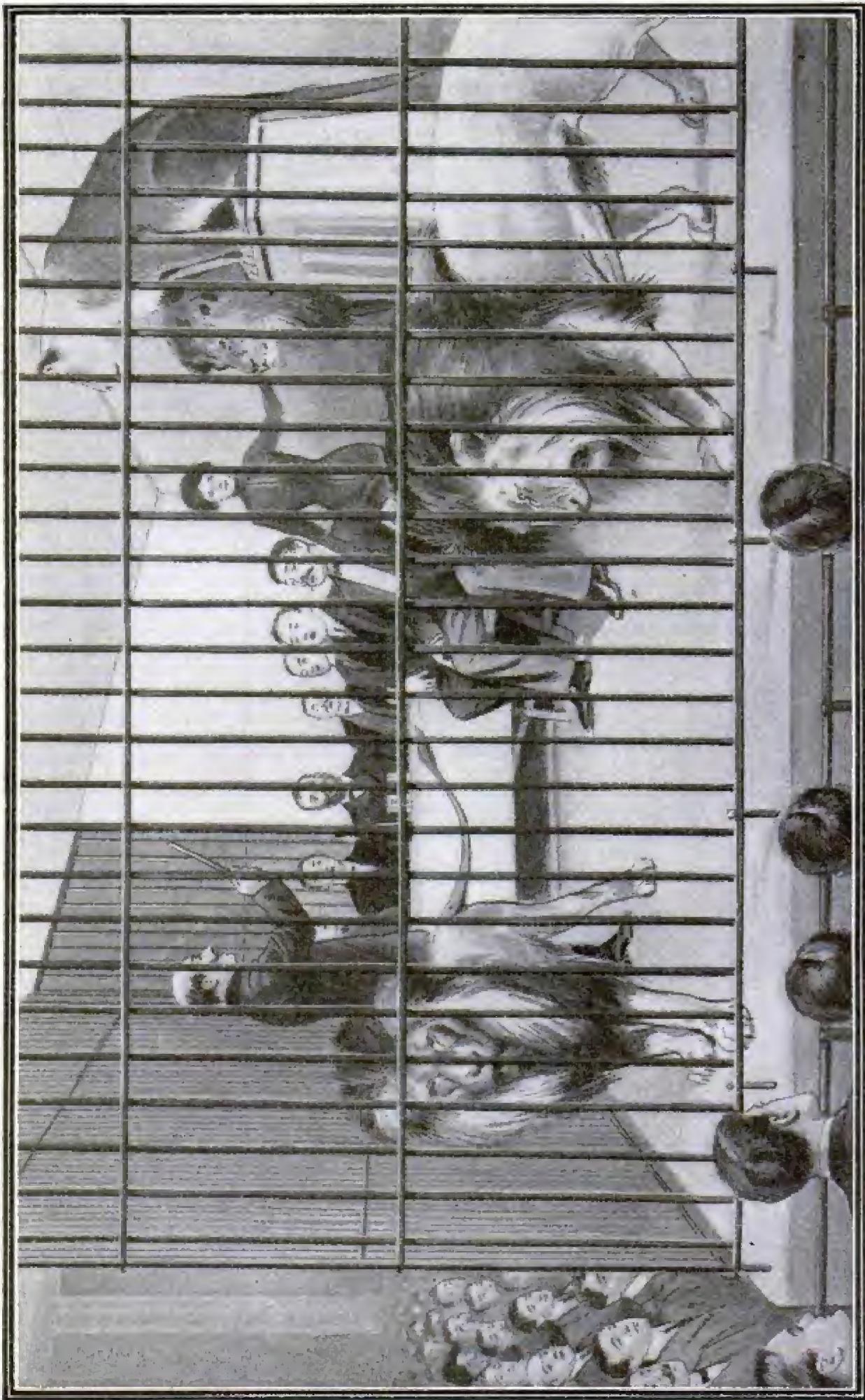
Water Meter Operating Fog Bell

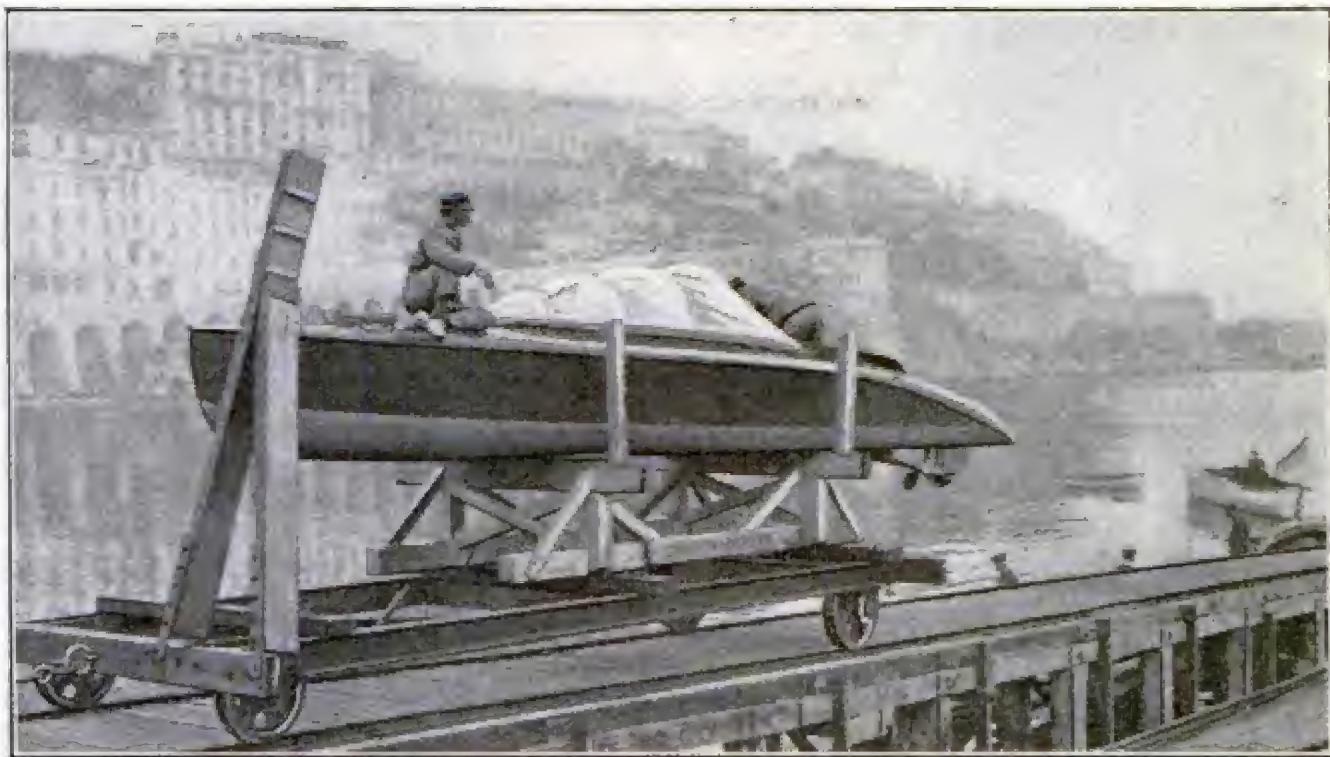
practical and useful by the company operating the ferry.

Baron d'Estournelles de Constant, the French advocate of international peace, has estimated that the wars during the revolution and the first empire have reduced the population of that nation by 20,000,000. He figures that the wars cost the lives of between 2,000,000 and 5,000,000 men, and multiplying the minimum by several generations, he reached his conclusion.

The choral society of Durlach, Germany, recently gave a concert in the lion's cage of a menagerie. Several songs were given, but the lions were perfectly quiet, apparently absorbed in the music.

#### CONCERT IN A LION'S DEN





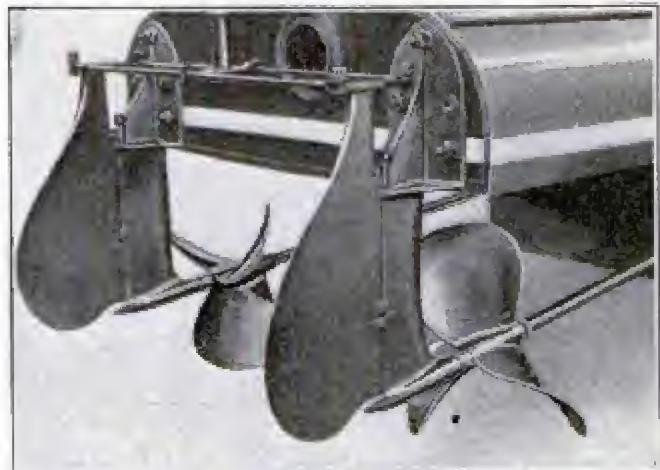
Launching One of the French Contestants

## MOTORBOAT RACING AT MONACO

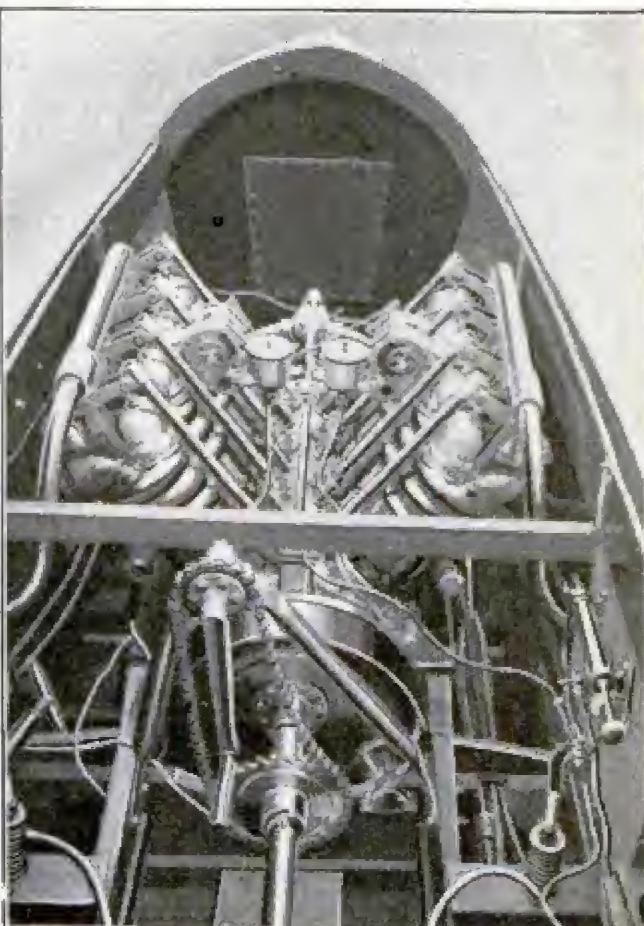
The motorboat races held every year at Monaco, in the very shadow of the great gambling casino of Monte Carlo, are probably the most exciting and extensive held anywhere in the world. Races are arranged for boats of nearly every type, size, and horsepower, from little 12-ft. dingies to powerful racers of 800 hp. Scenes in connection with the overhauling of boats before a race are shown in the accompanying illustrations.

It was at Monaco last year that the Duke of Westminster broke the world's speed record for any kind of water craft with the "Ursula," a

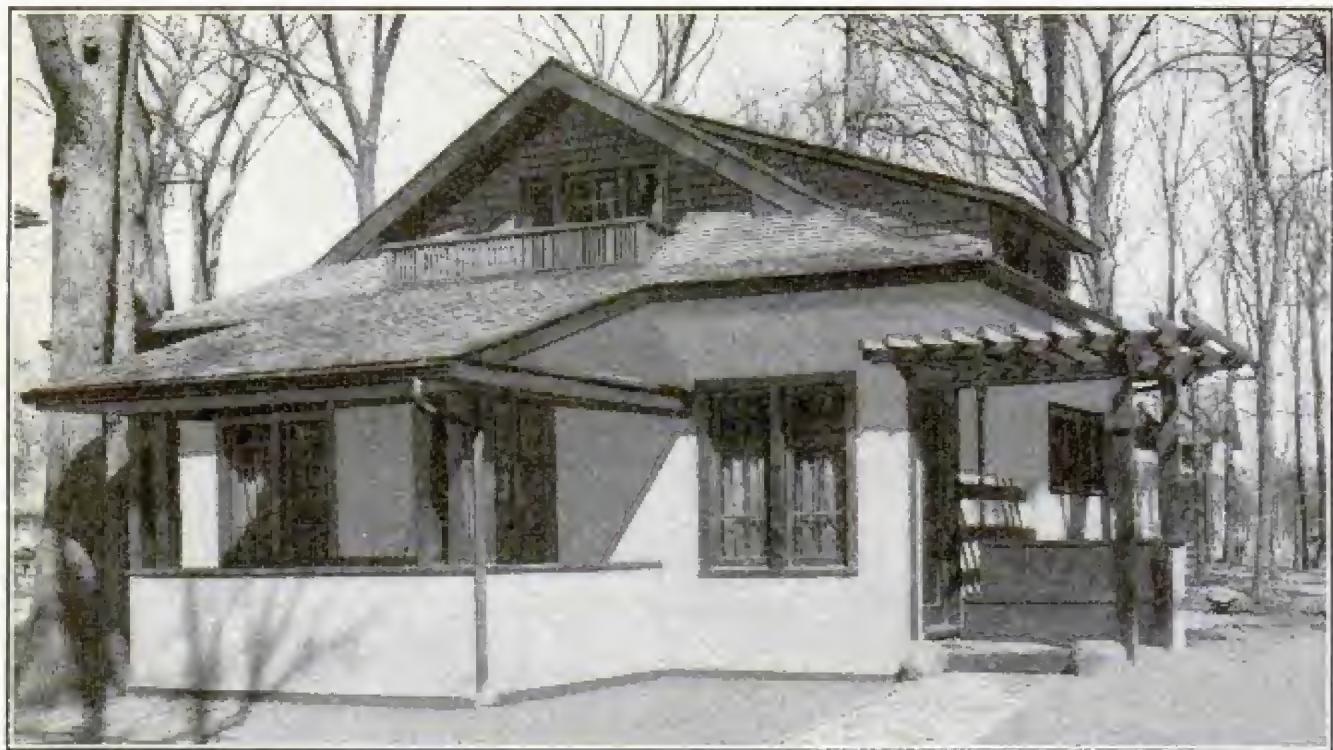
500-hp. motorboat. This year he has entered a hydroplane driven by two motors, the combined horsepower of which is 800 hp.



Stern of the "Maple Leaf III," Showing the Mounting of the Rudders on the Ends of Propeller Shafts



The 200-Hp. Motor of the Motorboat "La Fleche" (The Arrow)



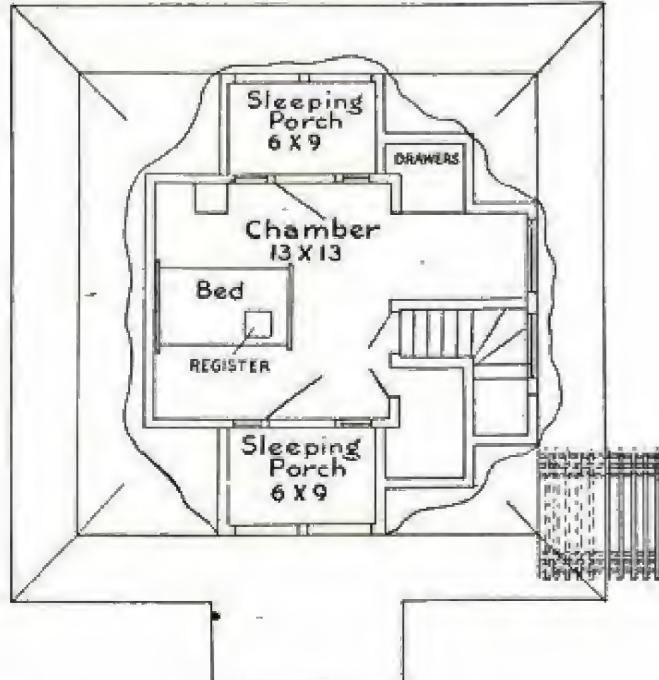
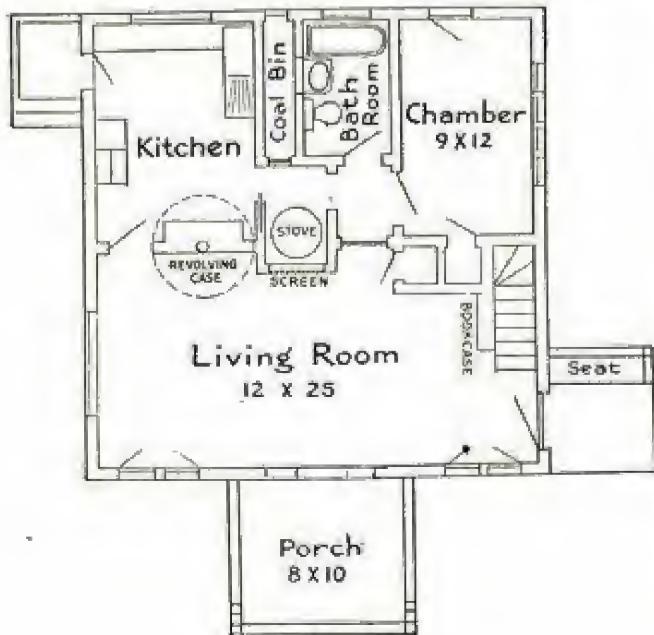
Exterior View of a Remarkably Artistic Bungalow in Which Every Inch of Space is Used to Advantage

## A WONDER BUNGALOW

By FRANK MAYNARD

**T**HIS magazine published last year an article entitled "A House of Many Wonders," in which was described a remarkably unique and artistic bungalow home, costing only \$1,600, and but 25 ft. square. Yet it

had, on the ground floor, a large living room, one end of which could, in a twinkling, be converted into a dining room, and the other end into a spare bedroom; a kitchen, bedroom, bathroom, china cabinet, chests of



Ground and Second-Story Floor Plans, Showing Dimensions of the Rooms

drawers, many closets, and also a folding stairway and a small loft bedroom.

The ingenious ideas incorporated in the little house were those of its owner, Adam Int-Hout, a young chemist of Chicago, who had but recently married and desired as artistic and complete a home as was within his means. Among the other requirements were, a home which Mrs. Int-Hout could easily take care of without a servant, and one that could be completely heated by one stove.

The result proved perfectly satisfactory, but soon after the article describing the unique house had been published, the troubles of the couple commenced. An almost continual stream of people journeyed to Evanston, the Chicago suburb in which the house was located, to see it. They came one at a time, in couples, and in parties. The record was reached on a pleasant Sunday afternoon, during which 50 people viewed the house both inside and out. Then the Int-Houts, too courteous to close the doors from the inside, resorted to strategy. Early the next Sunday morning they locked up the house and departed for parts unknown. For two months they did this, not returning until after dark. Tiring at last of these flittings, they decided to spend a few Sundays at home, but the people still continued to come. Then, in despair, they sold the house, slipped away to the adjoining suburb, Wilmette, and started the building of another wonder house, of which the remainder of this article will deal.

Naturally, Mr. Int-Hout profited by his first experience in house designing, and his present wonder house is a great improvement on the first. Then too, it cost about \$1,000 more, and the ingenious features are not quite so much in evidence. The folding stairway of the first house has given way to a solid staircase in the second; the sliding wall panel which admitted the dining table from the kitchen to one end of the living room when the meal was to be served, is absent, and the transition is accomplished by means

of a wall which revolves on a pivot. Likewise, the furnace-stove, which adequately heats the entire house in the coldest weather, is hidden by a grill, instead of standing out in the room, and the second floor is finished off into a large airy bedroom, with sleeping porches both front and back, and a little niche having a window seat and sufficient space for a sewing machine and other sewing accessories.

At the first view of the house one is struck with its artistic quaintness. But 26 ft. square, with a living porch 8 ft. by 10 ft. extending out from its front, and a little entrance porch provided with a porch seat at its side, it is built on a lot of 50-ft. frontage, between two great elm trees, whose foliage form a complete arch about 40 ft. above. All outside walls are cement stucco.

From the entrance porch, one steps into a beam-ceiled living room, 25 ft. long, by 12 ft. wide, extending unbroken clear across the front, with casement windows on all three sides. Directly to the right is the staircase, the balustrade side of which is a bookcase. In the center of the front wall are French windows leading to the living porch. Next to the staircase is a little closet for outdoor wraps. In the back wall of the living room is the opening of a small hall leading to the ground-floor bedroom, the bathroom, and the stove space. Next is the grill which hides the stove, and beyond this, the revolving wall and swinging door which close off the kitchen.

When not in use, the dining-room table is placed in a corner of the kitchen. It is set for breakfast, lunch, or dinner, as the case may be, in the kitchen, then the meal is placed upon it, the swinging door is hooked back, the revolving wall swung around, the table being pushed along at the same time, and in a moment one end of the living room has assumed the characteristics of a dining room. On one side of the revolving wall is a china cabinet, which is in the living room when the latter is converted into a dining room, and in the kitchen when the

## VIEWS WHICH SHOW SOME OF THE UNIQUE AND



Living room, 25 ft. long, as viewed from entrance, showing general arrangement, beamed ceiling and grill hiding the stove. The revolving wall may be seen just beyond the stove grill with its living-room side out. The electric light fixtures were designed especially for this room by the owner.

The swinging door between the kitchen and living room has been hooked back, the revolving wall half swung around, and the table, set for the meal, pushed partially into the living room, thus half completing the conversion of one end of living room into dining room. The window shown is of the casement type.



The end of the living room after it has been converted into a dining room. The side of the revolving wall, which ordinarily faces in the kitchen, now faces the living room. On it is the china cabinet in which are kept the dishes required from time to time through the meal. The cabinet is about a foot deep.



# ARTISTIC FEATURES OF THE WONDER BUNGALOW

View of one corner of the kitchen, with the dining room table in the position it occupies when a meal is not being served. After the meal, the soiled dishes are easily transferred to the dripboard of the sink, which likewise forms a top for the laundry tub. The furnace-stove may also be seen behind its grill.



Entrance end of the 25-ft. living room, showing the staircase with its bookcase balustrade. The stretch of beamed ceiling is artistically terminated just inside the staircase line by means of the shallow plaster arch. At the left is a coat closet. The drawers mentioned in the description of the ground-floor bedroom extend under the stairs.

The second-floor chamber, which is 13 ft. square, and has two sleeping porches and a deep window niche, the latter serving as a sewing room. The glassed-in sleeping porch at the back of the house is shown in the illustration, the photograph having been taken from the front sleeping porch.



living room again assumes its natural role.

Other features of the kitchen are the stationary porcelain laundry tub, the wooden top of which forms the drip-board of the sink, and the kitchen cabinet, located in the back wall. The lower part consists of drawers and swinging-door receptacles, and the upper of shelves, the unique feature of which is the glassing-in of both front and back. Were the kitchen cabinet of the customary type, and built into the back wall, the kitchen would only receive natural light from one side, but the glass at the back of the upper part of the cabinet is really a set of windows. The articles placed upon the shelves do not shut off the light to any serious extent, and the inner glass, in the form of swinging doors, not only lets the light through and keeps out the dust, but also keeps out most of the heat from the kitchen, thus, providing a place not too cold or too warm for the keeping of milk and other perishable foods during the winter months.

In the illustration which shows the dining table in the kitchen may also be seen the heating apparatus behind its grill. It is a hot-air furnace of the type used for heating houses of medium size, but it is used as a stove, there being no piping of any kind. Its cost was slightly less than for an ordinary coal stove covered with nickel.

The kitchen is 8 ft. by 11 ft., the bathroom  $7\frac{3}{4}$  ft. by 5 ft., and the ground-floor bedroom 9 ft. by 12 ft. Between the bathroom and the kitchen

is a 2-ft. space, provided with a slanting floor, for the storage of coal. Between the bathroom and the space containing the stove is a passage by means of which it is possible to pass from kitchen to bedroom, and to the bathroom without entering the living room. The bedroom has a clothes closet and a set of drawers, the longest of which is over 6 ft. These drawers slide under the stairs, thus completely utilizing this space, the longest drawer being the bottom one. It would, of course, be unsatisfactory to pull these drawers all the way out every day or so, but the back part of each provides space for the storing of summer garments during the winter, and winter garments in the summer.

The floor of the living room is of oak, highly waxed, and the wall covering is of a warm yellow-brown burlap. Both the ground floor and upstairs bedrooms are of rough plaster, tinted with burnt-orange. The upstairs bedroom is  $13\frac{1}{2}$  ft. square with a glassed-in sleeping porch at the back, and an open sleeping porch at the front. The sleeping porches, both 9 ft. by 6 ft., are entered by means of French windows. The upstairs bedrooms also have a spacious clothes closet and set of drawers, as well as the niche for sewing machine and window seat. The house rests upon a concrete foundation and there is no basement. The electric light fixtures in the living room were designed especially by Mr. Int-Hout to fit the house. The amount of coal required to heat the house during the past winter was a little less than five tons.

## EUROPEAN NATIONS BUYING MANY WAR AEROPLANES

Some significant facts concerning the activities of European nations in the acquisition of war aeroplanes were disclosed at the recent aero exhibition at London. The presence of two Russian airmen, sent by their government to examine the various machines, revealed the information that Russia has

decided to buy a fleet of 300 aeroplanes, all to be delivered before the end of the summer. It already possesses eight British-built Bristol biplanes, five Farman biplanes, and 40 Bleriot monoplanes.

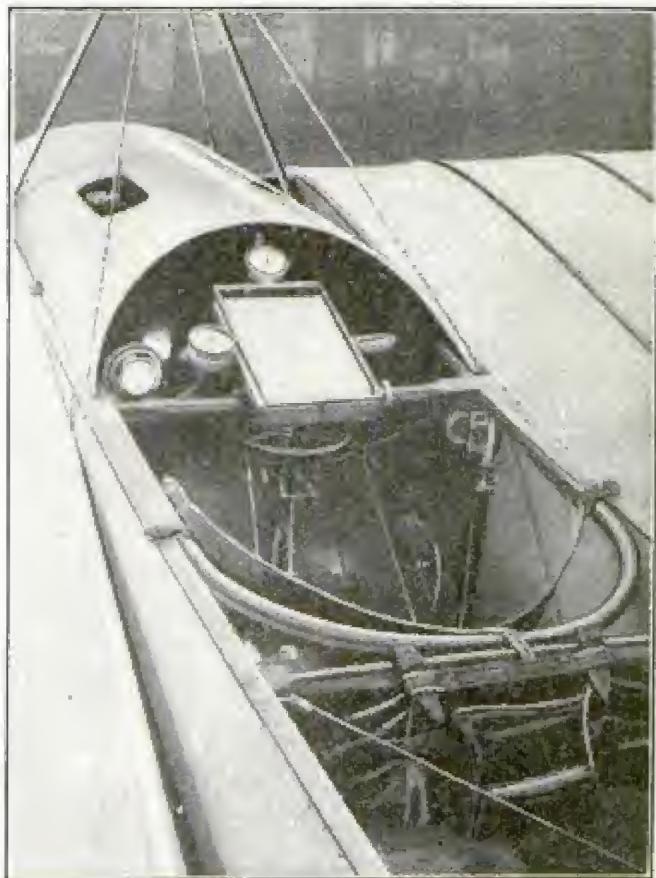
The representatives of M. Bleriot at the show declared that his firm is build-

ing 80 war aeroplanes for the French government. Thirty of these machines, both single and double-seated monoplanes, have already been supplied to the government and are in use. French officers have begun to learn to fly so rapidly that there are now not far short of 100 military airmen in France. So great is the demand now for war aeroplanes for various countries that M. Bleriot cannot deliver any more two-seated military machines for reconnoitering work for the next five months.

An extensive order for Breguet biplanes has been given by the French government. These machines, constructed almost entirely of steel, can be taken to pieces in half an hour for expeditious military transport. A number of Farman military-type biplanes—in which the two occupants of the machine sit in a neat enclosed body like that of a racing motor-car—have also been bought by the French, Italian, and Spanish governments.

With the recent orders for Bleriot and Farman aeroplanes, added to the number of machines of other makes already bought by the French government—such as Sommer, Maurice Farman, Antoinette, Goupy, Nieuport, and Hanriot machines—the French War Office will shortly possess an air fleet of at least 150 war aeroplanes.

The fast-flying war monoplane, as designed by M. Bleriot, was the striking feature of the exhibition. Sitting side by side, protected from the wind by a dome-shaped metal screen, and with maps and compass fixed in frames before them, the driver of the machine



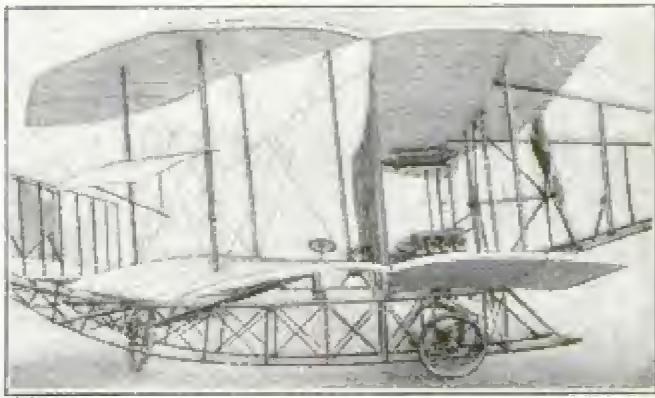
Pilot's Seat in New Bleriot Monoplane, Showing Maps, Compass, Watch, Barometer, and Revolution Indicator.

and the observer will rush through the air at a speed of 60 miles an hour, inspecting a wide panorama of country over the sustaining wings, which have been set farther back to facilitate reconnoitering.

A notable fact concerning the activity in France was cited by an international expert at the London exhibition. If France were involved in war tomorrow she could, by calling up her civilian airmen as well as her military pilots, put a fleet of more than 300 aeroplanes into the field.



A Three-Seated Biplane Body



Folding Wings on Sanders Biplane

## HOLLOW CONCRETE POLES

Various methods have been evolved for the construction of hollow concrete poles, but nearly all of them utilize a core or mandrel of some kind, around which to build the concrete shell. The one instance in which a core is not used is in a German centrifugal process of casting.

The tubular mold or shell consists of long wooden strips lined with sheet metal and linked together. In this is placed the steel frame for reinforcing the concrete. Then it is filled with a sufficient quantity of wet concrete, and the whole is placed in a lathe and rapidly whirled. The centrifugal force packs the concrete in a uniform manner against the walls of the mold, and, after hardening, the mold is removed and the finished product taken out.

**E**mery cord is a new product recently placed on the market for polishing out needle holes or small parts that cannot be readily reached. It consists of a strong cord coated with fine emery.

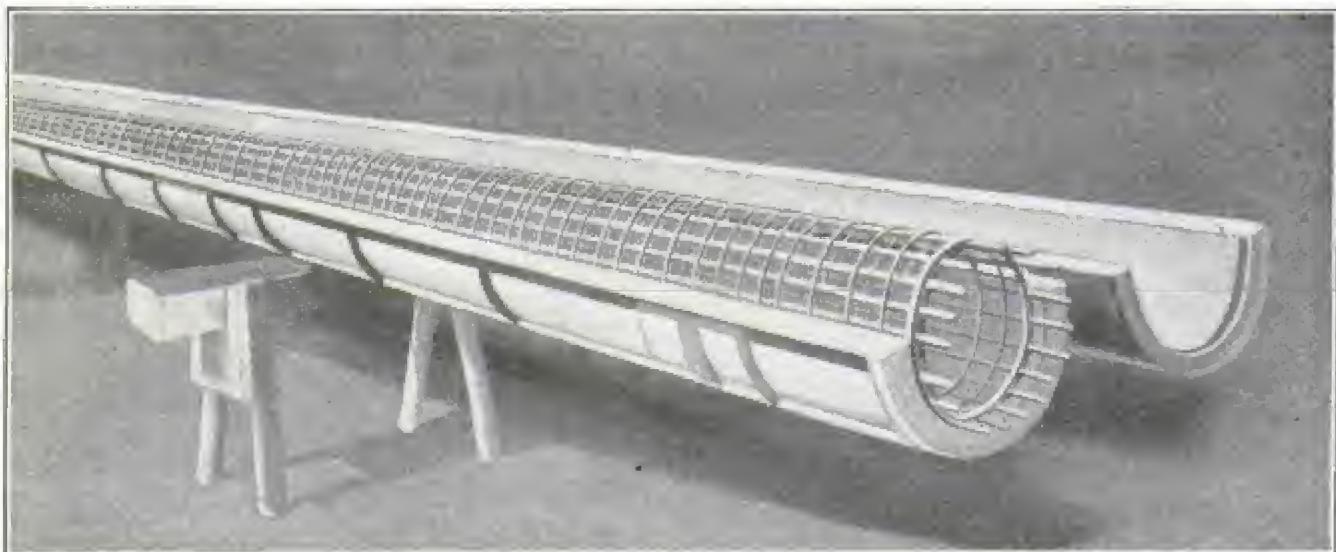


Hollow Concrete Pole  
Which Was Cast by  
the New Centrifugal  
Process

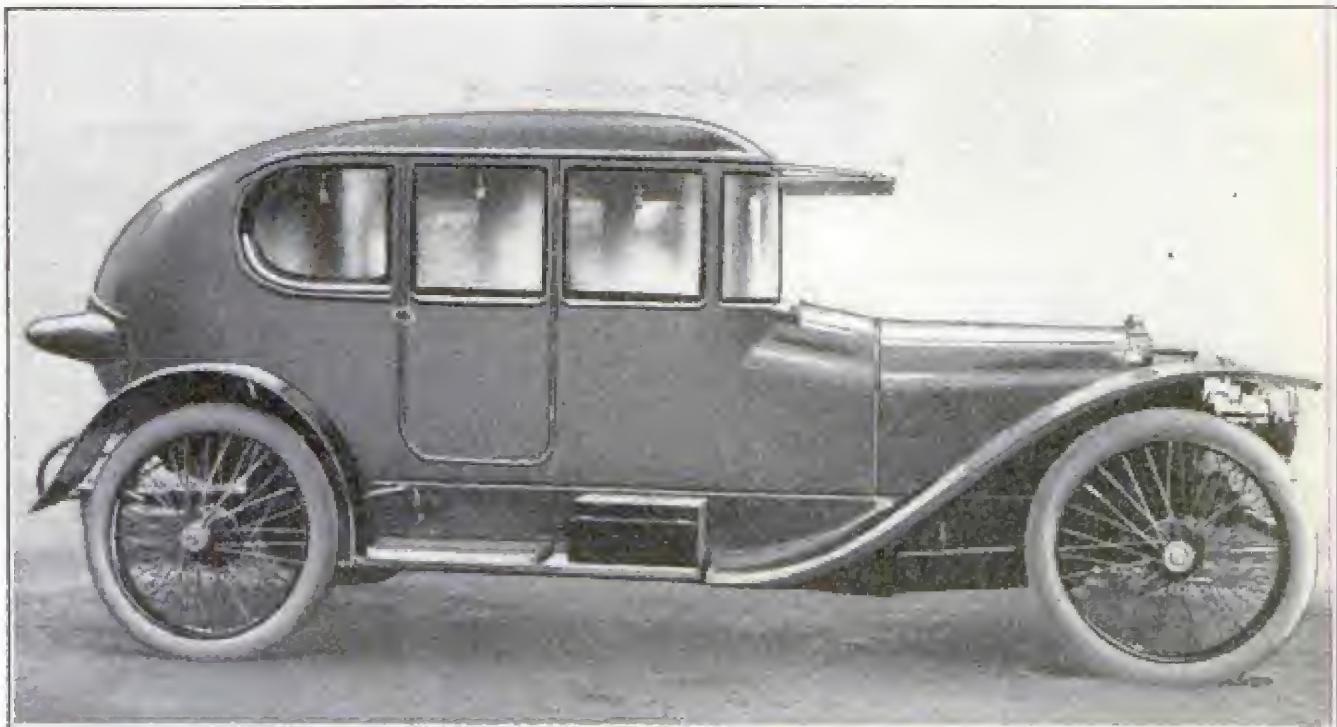
## LARGE ELECTRIC STORAGE BATTERY

An electric storage battery, weighing complete over 1,000,000 lb. and capable of supplying 4,000 hp. at a moment's notice, has recently been ordered by a Baltimore electric company. It is claimed to be the largest and most powerful electric battery in the world. Such batteries are now being largely used by electric power companies for use as a standby when a part of the electric generating apparatus is out of commission or when an unusually heavy overload is suddenly put on the system. For instance, during a heavy snowstorm in New York city last winter, the demand for current increased in ten minutes from 100,000 to 166,000 hp. Many a time a city has been left for hours without electric light on account of a disastrous short-circuit which disabled the dynamos. A storage battery in such cases will supply power to any desired amount within its capacity with little or no interruption to the service.

The Baltimore battery will consist of 152 cells of 133



One of the Molds Open, Showing the Steel Reinforcing Frame in Place



Aeroplane-Chasing Automobile Designed Both for Speed and Observation.

plates each. The lead-lined wooden tank for each cell will measure 4 ft. 2 in. high, 21 $\frac{3}{4}$  in. wide and 6 ft. 6 $\frac{1}{8}$  in. long, and will weigh 940 lb., without plates or liquid. The battery, fully charged, will supply enough current to light 120,000 tungsten lamps of 20 cp. each for one hour, or a corresponding amount of electric energy for a less or greater time as may be required.

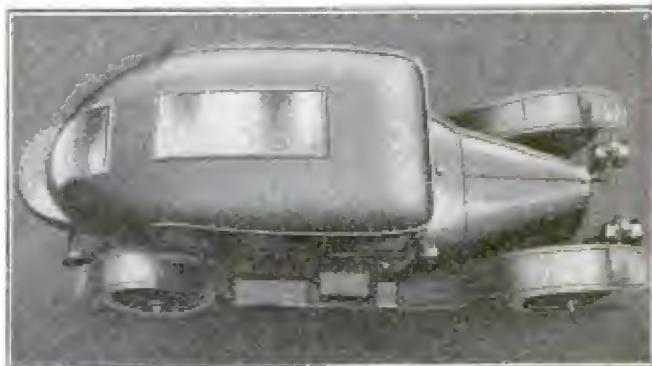
#### A HOTEL FOR IMMIGRANTS

A magnificent hotel for the use of immigrants has recently been opened in Buenos Ayres. Although but two stories high, it has sleeping accommodations for 3,200 persons, and railroad ticket offices are maintained on the premises so that those destined for the interior can purchase transportation without going outside of the hotel.

#### AUTO TO CHASE BALLOONS AND AEROPLANES

An automobile that caters to the wants of the tourist who would watch aeroplane and balloon flights without discomfort, as well as being constructed for high speed in all kinds of weather, has recently made its appear-

ance in France, and because of its extreme shape has attracted considerable attention. Entirely aside from the fact that it has what is called the submarine shape, and that the whole car is tightly inclosed from the driver's seat to the tool box and extra tire case in the rear, the top and back are fitted with glass so that the passengers and driver can see above and to the rear as well as on all sides. The peculiar shape of the car is designed to lessen resistance to the wind and permit of extreme speed. The driver's seat is inclosed. The tire case is incorporated in the body of the car and, with the tool box,



Windows in the Roof and Rear of the Aeroplane-Chasing Automobile

is reached by opening a door in the bulging, arc-shaped section in the rear.

## AERIAL PROPELLER-DRIVEN TROLLEY LINE

An aerial trolley line, the cars of which are patterned after the modern airship and driven by aerial propellers, is proposed between Burbank and



**Aerial Propeller-Driven Trolley Car**

Glendale, a suburb of Los Angeles, with the understanding that eventually the line will run directly into the heart of the city.

The unique nature of the aerial line and the type of car which will be operated upon it, is shown in the illustration of a section of the experimental line. The car, which is cigar-shaped, is built of aluminum, with the exception of the parts requiring steel. It will seat 50 persons, and is driven by an aerial propeller operated by a 20-hp. gasoline engine. For actual service the car will be inclosed in an aluminum shell provided with the necessary windows.

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CA London scientist has suggested that the custom of keeping house snakes, so prevalent in the tropics now, and in all sections of the world in ancient days, be revived as a precaution against rats that are now proven to be the vehicles of plague germs. The snake is regarded as a much surer exterminator of rats than either terriers or cats.

## AUTOMATIC STOKERS FOR LOCOMOTIVES

It has been reported a number of times in the past that a successful locomotive stoker had finally been designed, but a year or so later it has been found that it is still in the experimental stage, and finally it has practically disappeared from view, says the American Engineer and Railroad Journal. This is not meant to reflect in any way on the reporters, since there is no doubt that there have been several automatic stoker designs which would successfully maintain the steam pressure of the locomotive under very severe conditions, and from this standpoint they have been successful, but experience has clearly

shown that the mere ability to distribute large amounts of coal in proper form to be burned and thus maintain steam pressure, does not constitute a success, although, of course, it is an essential feature of a successful machine of this kind.

A really successful stoker, however, must, in addition to this, be reliable to the last degree. If it is not capable of operating continuously with a reliability at least equal to that of the air pump it cannot be considered an entire success. Further, it must be rugged enough to do this without any unusual attention in the roundhouse. No doubt, when stokers come into more general use, it will be found advisable to organize a small force in the roundhouse for their inspection and repair, practically the same as is now maintained for air brakes. While it can hardly be expected at the start, the successful stoker must finally prove itself to be in the same class with the air brakes and injectors and should be treated in the same manner at terminals.

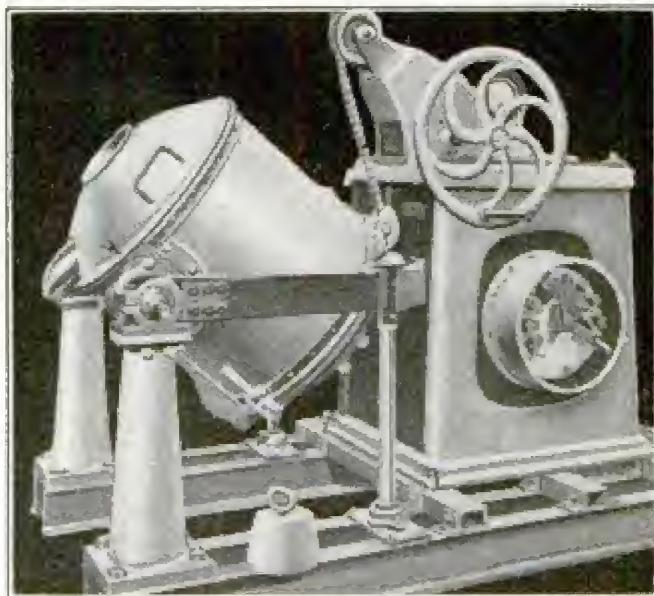
The ability to handle quantities of

coal beyond the limits of hand firing will, of course, be demanded of the automatic stoker, and while it is desirable to burn this as economically as possible, the first essential is to burn it and maintain the steam pressure. An increase in the "horse power of the fireman" is the constantly increasing demand of present conditions.

### ELECTRIC TRANSFORMER CRUCIBLE FURNACE

The largest of a new and unique line of German electric furnaces for crucible melting is shown in the accompanying illustration. These furnaces are intended for the melting of brass, copper, silver, gold, platinum, tin, zinc, iron or steel, and also for glass, enamel, etc., and range in capacity from 1 lb. to 250 lb. The method of tilting the larger sizes is clearly shown in the illustration.

The ordinary graphite crucible is used, but must be first treated with a special preparation supplied by the maker of the furnaces. The principle



Largest of a Unique German Line of Electric Transformer Crucible Furnaces

of these furnaces is not new, being that of electrical resistance, but it is claimed that the firm construction, the rapid and certain manner of working, the lack of annoyance from heat, smoke or soot, and the possibility of continually watching the melting process, make this furnace the most perfect evolved up to the present time.

### A SUBMARINE DREADNOUGHT

By L. WILLIAM THAVIS

The United States government has under construction 13 submarines, three of which are the largest and most

formidable in the world. If the first of the largest type proves a success, this improved engine of warfare will



The "Seal," Just Completed for the Government, Which Embodies Some Advanced Ideas in Submarines

have a large bearing on the future of the navy. It will tend to increase the importance of subsurface war vessels, and at the same time lessen the importance of the greater battleships which this and other countries are striving to build.

Three of the 13 submarines are being constructed by the Lake Torpedo Boat Company, while the others will be of the Holland-Electric type. The first of the submarine Dreadnoughts to be constructed was the "Seal." The government will give the strange and uncertain craft a trial trip across the Atlantic.

If the "Seal" type comes up to the specifications and promises, it will be capable of going long distances. Its length is 161 ft. and its displacement about 535 tons. The government contract calls for a speed of 14 knots (16.12 miles an hour), but it is expected to make more. This is when the submarine is traveling on the surface. The submerged speed by the contract is  $9\frac{1}{2}$  knots (10.9 miles an hour). The cruising radius on surface and at an economic speed is expected to be over 2,800 miles.

The "Seal" is called a submarine dreadnought, and is designed especially for long ocean cruises in rough weather. It is designed to travel alone, without being accompanied by a tender. The armament consists of six torpedo tubes and room is provided for

10 torpedoes. The crew will consist of about 22 members.

As with other submarines, the "Seal" can travel on the surface, or partially submerged, or completely submerged. If the "Seal" can travel as its inventor expects it to, there is nothing to prevent its going along as an auxiliary with a fleet of battleships and in an engagement sneaking quietly under the surface into the very midst of the fleet of the enemy.

Among the new features of the submarine are hydroplanes. These correspond to the planes of an aeroplane. They are designed for the purpose of steadyng the boat and holding it even when under the water. Another feature is the drop keel, which weighs several tons, and can be released in case of an accident, thus adding to the buoyancy of the vessel. On the bottom of the boat are wheels, calculated to protect the bottom when the vessel drops down to the bed of the ocean. Various other features are important in the construction of this type of submarine.

The provisions for the safety of the crew are as complete, seemingly, as they can be made. Enough storage air is provided for 48 hours under water. The vessel is provided with powerful gasoline engines, which propel her when running at the surface. But under the water the power is furnished by storage batteries.

### THE SOUTHERN PACIFIC'S \$10,000,000 TUNNEL

It is said that the Southern Pacific Railroad Company will soon commence its long projected tunnel under a portion of the Sierra Nevada mountains. The total length of this immense tunnel, which has been held in contemplation for almost 10 years, will be six miles, and the cost will approximate \$10,000,000. Its completion will materially shorten the line, do away with many grades, and make the line practically free from snow troubles.

### GREAT BRITAIN TO BLAZE ON CORONATION NIGHT

If the proposals are carried out, great bonfires will blaze from nearly all the headlands and heights of Great Britain on the night of the coronation of King George, June 22. The committee having the plans in charge recommended that a detonating rocket be sent from every principal height of England, Ireland, and Wales at 9.55 to call attention, and that at 10 o'clock a magnesium star rocket should be fired, to be followed by other rockets and the lighting of the



Courtesy the Sphere, London

The Heights and Headlands of Great Britain are Expected to Blaze with Bonfires Such as These on Coronation Night

bonfires. The program for Scotland is the same, but the time is set half an hour later, owing to the long daylight in the north.

#### SAILS AS RAILWAY MOTIVE POWER

In the vicinity of Antofagasta and Orouro, Chile, are several remarkable short railways, which utilize the trade winds as motive power, the cars being equipped with sails. The idea of the sailing cars is credited to an engineer in charge of important government coast improvement. Impressed by the

fact that a stiff breeze could be depended upon for several hours every morning and evening, he built several cars and provided each of them with a sail. The idea proved so practical, according to the Railway and Engineering Review, that a number of such railways soon followed, the cheapness and practical worth making a strong appeal.

The speed attainable by the sailing cars is said to be as high as 35 miles an hour, but this may be checked to any extent desired by the manipulation of the brakes. The trade winds blow with clock-like regularity.

## A PROJECTILE AS A SATELLITE

Flammarion, the French astronomer and scientist, commenting on the increasing size of big guns, says that a



Flammarion Says a Muzzle Velocity of 26,000 Ft. per Second Would be Sufficient to Enable a Projectile to Overcome the Earth's Gravity Enough to Become a Satellite

muzzle velocity of 26,000 ft., or 5 miles, per second would be sufficient to enable a projectile to overcome the earth's gravity enough to send it re-

volving around the world forever as a satellite having a 1-hr. 20-min. orbit.

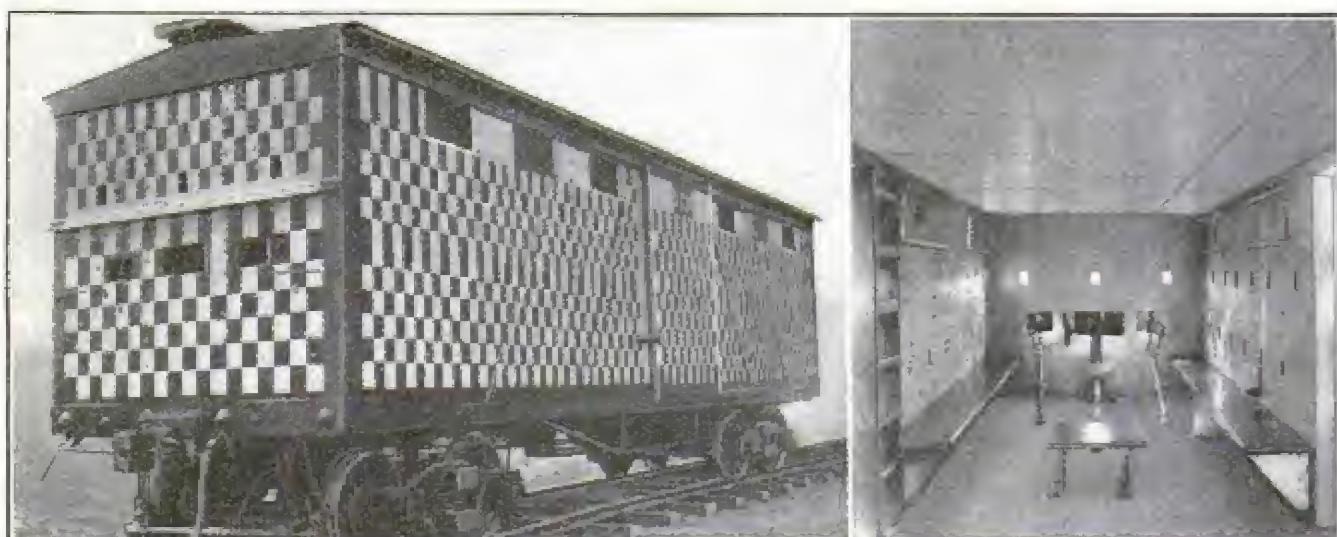
It is suggested that such a projectile-satellite, making a complete revolution around the world once every 80 minutes, would provide a useful world's timekeeper, or a monument to the world's peace.

The muzzle velocity of the 12-in. guns of the United States navy is about 2,400 ft. per second.

## STEEL SHEATHED CARS FOR MEXICO

In its effort to put down the revolution in the northern part of the republic, the Mexican government has constructed three armored cars, and an armored engine to draw them over the lines of railroad which pass from the capital northward to the United States boundary. The cars are ordinary freight cars, lined inside with  $\frac{1}{4}$ -in. steel, with a space of 3 in. between the wooden sides and ends and the steel lining in which sand has been poured, making an armor practically impenetrable to the ordinary rifle ball.

In each end of each car have been placed three rapid-fire guns, while there are portholes on each side for 20 rifles. Benches beneath these portholes furnish standing space for the men while firing out of the portholes. The doors of the cars interlock with the walls, and the whole outside of the



Exterior and Interior Views of Railroad Car Transformed into Moving Fort by Mexicans. Checkerboard Appearance Makes it Difficult for Enemy to Locate Portholes



48-Horse Team Hauling Machinery for a California Electric-Generating Station

cars is painted black and white, checkerboard pattern, with the portholes in black squares, so as not to be visible to the enemy. The engine to draw these cars is an ordinary small passenger locomotive, completely sheathed, from top of smokestack to bottom of drivers, and from rear end of tender to pilot, in  $\frac{1}{4}$ -in. steel.

#### ELECTRIC ILLUMINATION SPOILS OBSERVATORY

Owing to the steadily increasing brilliance of the electric illumination in the vicinity, the astronomical department of the Brooklyn Institute of Arts and Sciences has started an active campaign for a new observatory, to be located near the institute building on Mount Prospect. Not only does the direct light of the great electric signs affect the observations, but the sum total of the downtown lighting is said to be so great that it sets the entire heavens aglow.

#### TRANSPORTING MACHINERY IN WEST NO EASY TASK

Most people are familiar, from reading accounts in the public press, with the great engineering projects that are going on in our great West. But few realize the enormous difficulties in transporting heavy masses of machinery over rough trails and paths in the mountainous districts, far from the railroads or the navigable streams and canals that help to simplify such tasks in the more thickly settled communities. The illustration shows a 48-horse team struggling along with a heavy casting destined for the Kern River hydroelectric plant of the Southern California Edison Company.

A parlor trolley car is to make its appearance on an Illinois interurban road, the first of its kind for the use of the general public. This same company operates a regular line of sleeping cars for night passengers.



A Picturesque Elopement—Emma's Hotel Going to Its Successful "Suitor"

## A MUNICIPAL ELOPEMENT

When a town in the panhandle of Texas finally yielded to the seductive offers of a suitor and eloped, she—the town's name was Emma—adopted the appropriately unique method of eloping by traction engines. This sets a new record in elopements and in municipal deeds. The story is of one of the most picturesque of county-seat scraps, which grew out of the fact that Emma, the county seat, was not located at the geographical center of the county, nor in fact within the five-mile radius of the geographical center, which the Texas law requires.

When records from the surveyor general's office showing the county center were received, two rivals sprang into the field, desperately wooing and hoping to win Emma by offers of trades of lots for lots in Emma. The result was that Emma's old home on the prairie is now deserted and from each yawning cellar-hole there are deep grooves in the sod across the fields to Crosbyton. Hereafter, where Crosbyton lodges there will Emma lodge, and the name of Emma has been obliterated from the map in favor of Crosbyton.

It was a picturesque passing, the drygoods and grocery emporiums, the churches, the school and the flock of

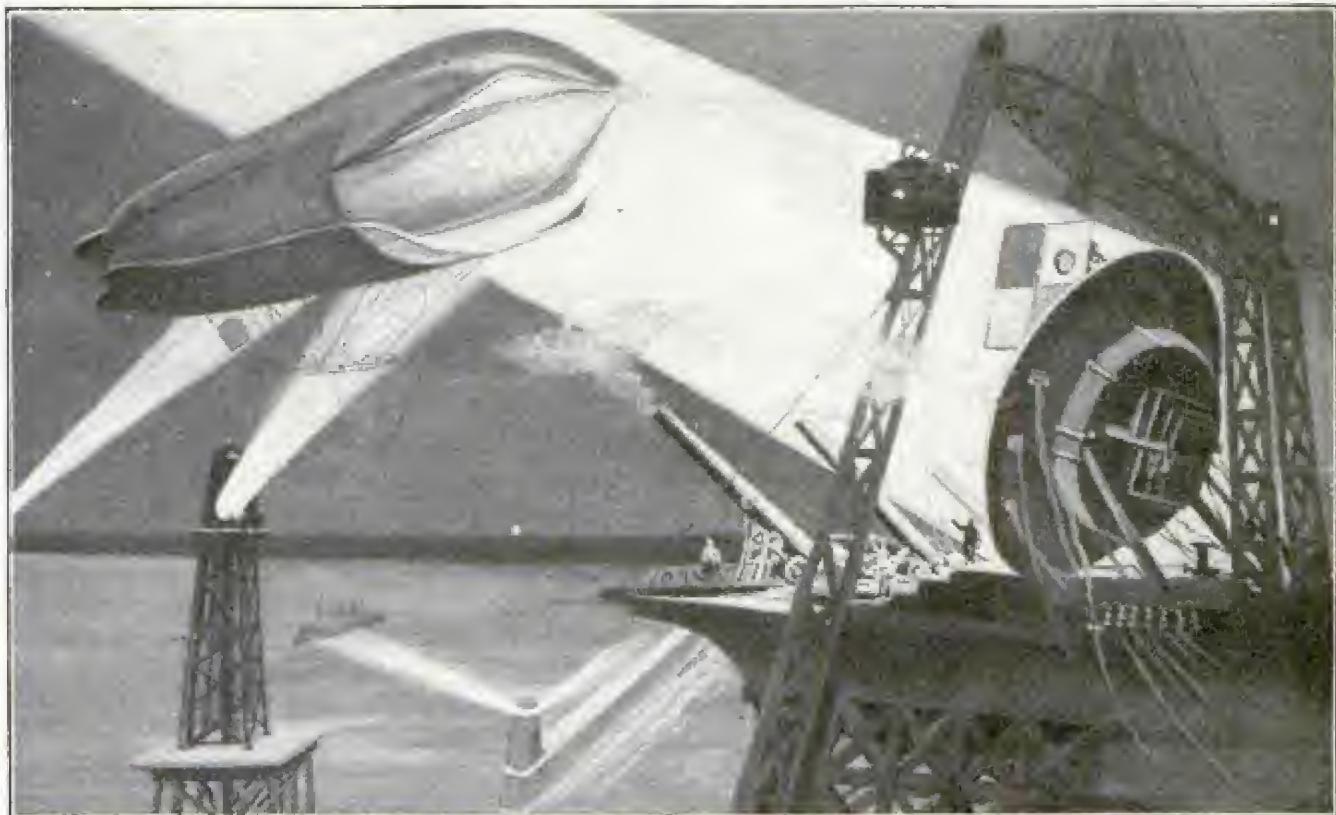
houses which had constituted the town of Emma: To-day they are all scattered through the town which was the successful rival in the race for the county seat. The last of the buildings was moved during the winter. The first started across the prairie on August 17, last year, and by the 19th the elopement was on, 11 houses were under contract to be moved, two churches and a parsonage were on the way. When the day for the county seat election arrived, the town of Emma was already standing up with Crosbyton, ready for the knot to be tied. An injunction against the formal nuptial knot was secured, but the county judge, after turning the ballot boxes over to the county clerk, calmly drove out of the county and left the rival claimants to settle their own disputes.

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¶The asphalt resources of Cuba, are expected to prove superior to any other in the world, not excepting the famous deposits in the island of Trinidad.

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¶A Boston electric company has equipped one of its electric automobiles with a motor-driven outfit for pumping out manholes.



#### A VISION OF THE FUTURE

A French artist's idea of how coast defenses will appear in the future, fitted with powerful searchlights and huge guns to repel attacks by aerial craft

#### TO DEFEND GERMAN ARMY AGAINST AIR CRAFT

German ordnance experts claim to have developed a gun that will furnish protection against balloons and aeroplanes under all ordinary conditions.

This gun and its limber are incorporated in an automobile carriage, the gun being loaded and fired on the platform formed by the bed and sides of the car.



New Gun Designed for the German Army as Protection Against Air Craft

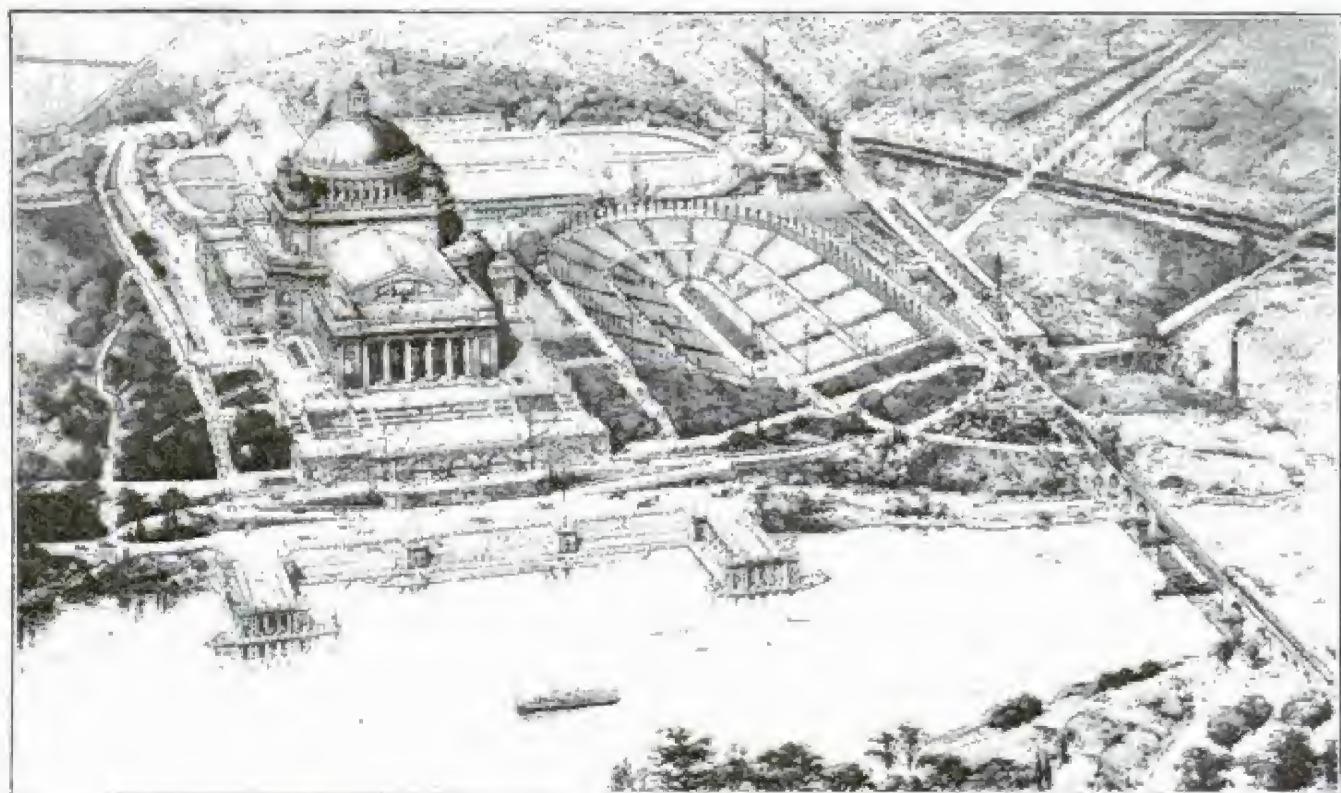
The ammunition is carried in chests under the driver's and gunners' seats in the front and rear. The gun is mounted just behind the center of the truck and when in action the platform on which it is mounted is furnished with extra bracing by a long arm which is let down from the frame of the car and rests on the ground, thus permitting the absorption of at least a part of the shock of the explosion and recoil, and relieving the strain on the running gear.

One feature of the car that appeals to artillerymen is that the bed of the

contact shells, and time fuses did not always explode near the object of attack. The new fuse was developed by the Krupp experts.

### PLANNING A PHILADELPHIA BEAUTIFUL

Included in Philadelphia's \$200,000,000-plan to make the city both attractive and practical, is included an amusement center with a great convention hall as one of its chief features. The city government has under consideration an immediate appropriation



Sketch of Philadelphia's Proposed Amusement Center, with Great Convention Hall as a Chief Feature

body need not be any wider than is necessary to mount the gun, as the wide sides of the car are hinged and can be let down to form a platform on which the gunner stands. The mounting of the gun provides, of course, for the direction of the fire toward the sky.

With this gun, it is understood, there will be used the new German shells that explode on contact with the lightest fabric. These shells have been recently perfected and are regarded as a great advance over the ordinary ammunition. Heretofore more positive resistance than the delicate fabric of a balloon envelope was necessary for

of \$500,000 to start the work, and a total appropriation, before June of next year, of \$1,500,000 for the amusement center. The plans submitted by the citizens' committee include improvements that will cost over \$200,000,000. Some of the most important features, the mayor believes, can be taken up within a reasonable time. Legislation now pending will enable the city to borrow virtually an unlimited amount for subway and dock improvements, provided such improvements yield sufficient revenue to meet the interest charges, and create a sinking fund to retire the bonds.

# COMMENT AND REVIEW

**T**O the average man, a hair cut is simply a necessary and unpleasant evil, and the thought of making the event a great social function, to be performed as a solemn ceremony, would seem ridiculous. There was, however, a case of bartering recently, which not only became the talk of a whole nation, but the event was cabled around the globe, and to diplomats, scientists and students of world progress it was full of significance. For centuries his queue was dearer to the Chinaman than even the head which it adorned; in fact, if he went abroad and lost his locks, he had much better never return. But even time, which moves slowly in the land of Confucius, perhaps because it has been moving so many thousand years, at last brings a social revolution, and the queue is about to lose its hold. The average American is so absorbed in doing things he is quite indifferent as to whether he is bald or not, and is therefore unable to realize the portentous seriousness of a Chinese hair cut. A guillotine execution in France would cause far less excitement.

The leader in this reform is no other than Wu Ting-Fang, at one time Minister to the United States. One hundred and fifty leading officials, business men and prominent citizens joined him in the ceremony, which was performed in public after due announcement. With such a notable example, the effect upon their four hundred million of fellow-citizens can be imagined. Seriously, the event means vastly more than the loss of a few handfuls of long hair; it reflects the growing spirit of an age of progress in the largest and most exclusive nation in the world, and is significant of a development which, a generation or less hence, will give the other nations of the world abundant food for thought—if not action.



**T**HE greatest naval pageant in the history of the world will be the most spectacular feature of the ceremonies incident to the opening of the Panama Canal. The President has been authorized by Congress to invite all foreign powers to participate in a great naval parade, which will insure not only representation of every navy in large numbers, but each country will send its largest and best ships. The spectacle will be the sight of a lifetime.

The fleets will assemble in Hampton Roads and proceed up the Chesapeake Bay and Potomac River to Washington, where a formal call will be made upon the President of the United States. On their return the President will review the fleets from his yacht, which will be stationed at the Virginia capes; then this vast armada will sail southward and pass through the Panama Canal as part of the official opening program. By no means the least interesting part of the announcement is the continued cruise of the

*Prominent  
Chinese  
Cut Queues*

*Parade  
of World's  
Navies*

combined fleets to San Francisco, during the Panama Canal Opening Exposition. This will furnish an attraction which no international exposition has ever had, and will enable thousands of people who cannot get to the Atlantic coast, to enjoy the inspiring sight of the greatest assemblage of fighting ships ever brought together in the history of the world.



**T**O discontinue the time-honored custom of delivering mail to callers at the postoffice on Sundays, seems at first thought like a step backward. The tendency of the age would more naturally suggest one delivery at the home or office. Conditions have changed, however, to so large an extent during the past few years as to make Sunday closing of the postoffice, at least in the large cities, a not impractical thing. In the smaller country towns, where carrier service is not maintained, the labor involved to distribute the letter mail would impose no very serious hardship on the postmaster, or his clerk, for the amount to be handled is comparatively small. In the large cities, however, conditions are reversed: Not only must an enormous quantity be sorted, but it must necessarily be done by the same carriers who have worked hard all the week; and after sorting they must remain to hand it out, because they alone are able to recognize the proper parties to whom it should be delivered.

While an occasional hardship must result to travelers who wish to leave the city Sunday night, yet the number of such compared to the public served is really infinitesimally small. It is said a larger number of business concerns in Chicago than any other city call for their office mail on Sunday, and yet a recent count developed the fact that less than one-fifth of one per cent of the population used the postoffice on Sunday, and not to exceed 20 per cent of those who did call received anything. On a recent Sunday in Jersey City, with a population of over 300,000, only 36 persons called for mail, but to accommodate this handful 121 men were compelled to report for work.

The recent facilities of the telegraph companies in providing night lettergrams at prices practically within the reach of everybody, would seem to greatly simplify the Sunday-closing question, as the rates to points within 500 miles would debar few from their use in case of emergency, and letters coming from any greater distance would usually be 24 hours old, too long a time in case of illness or death. Business men would generally use the wires for telegraph or telephone, regardless of Sunday closing.

The work of the letter carrier, both city and rural, is hard enough at best, and the public should willingly make some sacrifice to give this great army of faithful, conscientious workers a day of rest. There are many services, especially in cities, which cannot be entirely abandoned even on Sunday, but the closing of the postoffice on that day would seem not to be one of them.

H. H. WINDSOR



The Parts of the New Milk Container Disassembled Showing  
the Three Essential Features

Manner in Which the New Milk Container for  
Grocers is Used in Retailing Any Quantity

## SCIENCE HAS NEW WEAPON TO FIGHT IMPURE MILK

Some modern philosopher has said that assurance of pure milk is the best insurance of life to the infant of the tenement. Scientists in all countries have worked for years to evolve systems of insuring the purity of milk, some of which are successful while others have left the life-maintaining fluid open to all sorts of germs. The latest device that has been presented for this purpose appears to have many advantages in that it furnishes practically a sealed receptacle for the use of the milk dealer, permitting the sale of any quantity, absolutely preserving the milk from contamination, and providing cold storage.

This promising device consists of two vessels, one of metal and the other of wood. The metal vessel, which is the milk container, fits inside the other, leaving plenty of room for ice between them. The covers of both vessels are screwed and clamped on tightly. A pipe, led through the outer wooden vessel, connects a sanitary measuring device and faucet combined with the milk container, into the lid of which it is tightly screwed. A stand which permits the tilting of the entire apparatus is furnished so that it may be emptied to the last drop. The faucet and measuring device consist of a large glass cylinder into which the

milk is drawn in the quantity desired. For this purpose the cylinder is graduated and provided with a piston, which can be set at any point of the cylinder by means of a threaded regulator. When the amount of milk wanted has been drawn into the cylinder, a spring cock is pressed and it flows out into the pitcher or glass of the purchaser. The whole is so made that all the parts can be easily cleaned.

## MOTORBOAT MAKES NEARLY MILE A MINUTE

Previous to being sent to the Monaco races, the British international racer, "Maple Leaf III," is said to have attained the marvelous speed of  $49\frac{1}{2}$  knots (about  $56\frac{1}{2}$  miles per hour) which is by far the fastest time ever made by any water craft. This record was not officially timed, however, and consequently cannot be considered as a standing record.

The "Maple Leaf III" is a twin-screw boat, 40 ft. long, with a beam of 9 ft., driven by two engines developing about 650 hp.

Driving the famous 200-hp. Benz car, "Bob" Burman attained a speed of 141.7 miles an hour at Daytona, Fla., on April 23.

## A DOG THAT REALLY SPEAKS WORDS

There have been many so-called speaking dogs, that is, dogs who have

this remarkable dog can really speak, although its vocabulary is limited as yet to about ten words.

The wonderful gift that enables the dog to articulate was discovered quite accidentally by its owner, Herr Hermann Ebers, a German royal gamekeeper. One day the dog was begging at the table and his master asked him (in German, of course) "What will you have?" The dog answered, "haben" (have), and since then has been taught eight or nine other words. His name is Don, and this word he can say very distinctly, also "Ruhe" (quiet) and "Hunger" (hunger). That he can really articulate has been proven not only by the

fact that he does speak the words, but also by examination by scientists.



*The Dog That Actually Articulates and the Daughter of His Master, Who is a German Royal Gamekeeper*

been trained to give a certain number of barks to indicate certain wants, but

the fact that he does speak the words, but also by examination by scientists.

## CONCRETE STAND BUILT IN RECORD TIME

One of the most remarkable achievements to date in the field of rapid concrete construction was recently concluded in the city of Washington, D. C. It involved the construction within a period of 22 days of a concrete grandstand 500 ft. in length and 69 ft. in width. On March 17 of this year the grandstand at the major league baseball grounds at the national capital was totally destroyed by fire. As the regular baseball season was scheduled to begin on April 12, the resulting situation was a serious one. However, plans were quickly drawn, and on the morning of March 20 a large force of men set to work in a race against time.

Work was carried on day and night by a force of more than 800 men work-

ing in three shifts. The concrete work was all in the shape of steps, forming a vast semicircular structure, and there were employed wooden molds or "falsework" of the regulation type, most of this frame support being allowed to remain in place after the stand was ready for occupancy. For one interval of three days the operating force maintained a record of 1 sq. yd. of concrete per minute,—mixed and poured into place. The contract involved the laying of 600,000 sq. yd. of concrete reinforced by steel rods, ranging in dimension from  $\frac{3}{16}$ -in. round rods to square rods  $1\frac{1}{4}$  in. square. About 6,000 sq. yd. of concrete was used in the foundation for the stand. On this contract there was no time to install the ordinary style of



Rushing the Work on the Washington Baseball Grandstand

plant for handling concrete, and accordingly the great buckets of concrete were hoisted by derrick from the mixer to a hopper at the top of a wooden tower, centrally located.

#### HEADLESS BUTTERFLIES

According to the French scientific review, *Cosmos*, two French biologists have produced butterflies without heads.

They carefully removed the heads of a number of larvæ and most of them survived the operation, continuing to develop into the pupa stage; but only some few underwent the last change and emerged as normal butterflies—minus the head.

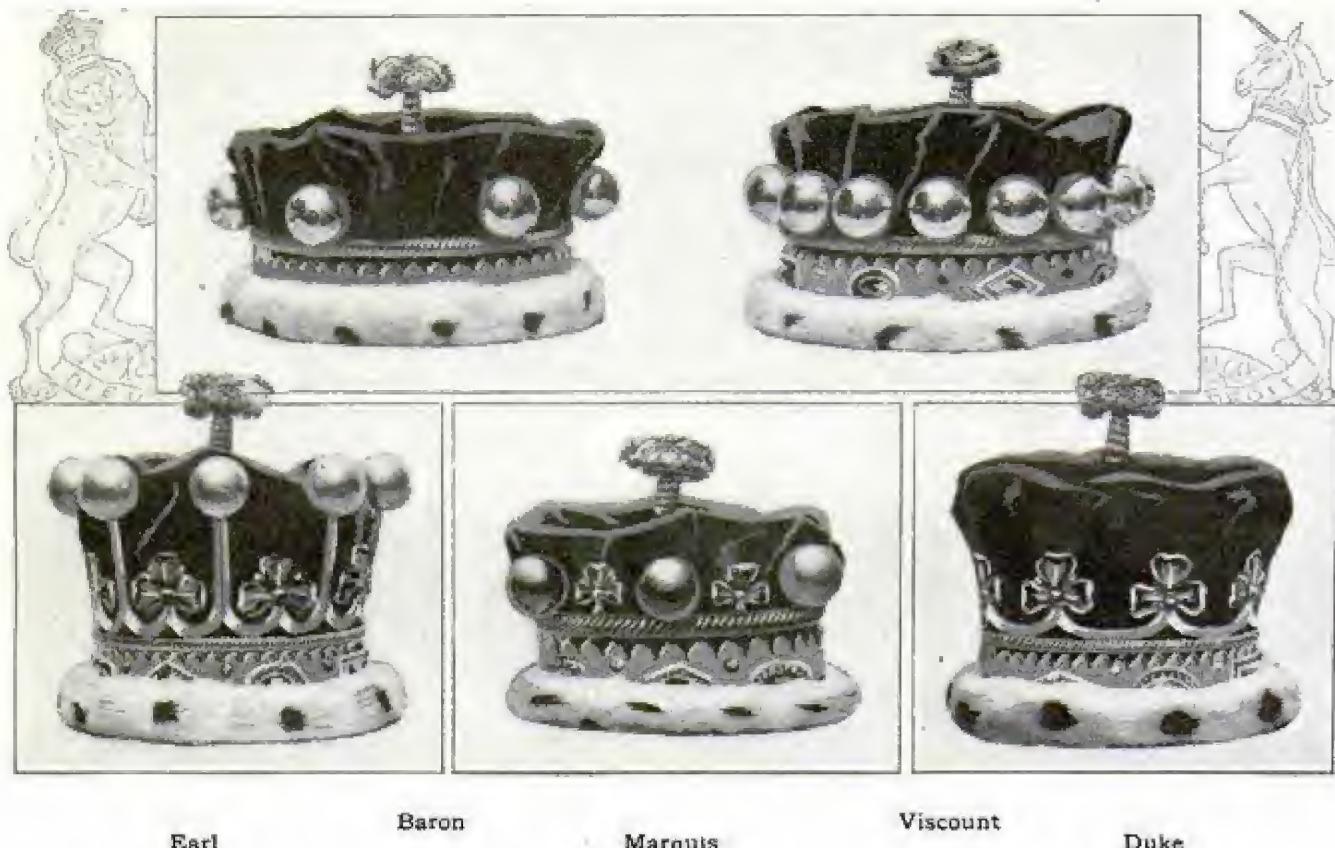
#### PLACES BURDEN OF HAND BAG ON SHOULDER

Creators of fashions for women in Paris have devised a new adjunct to feminine furnishings which is nothing less than a handbag of large size. The bags are mostly made of gobelin tapestry, are frequently embellished with large tassels and fringes and bear some

faint resemblance to the old-fashioned carpet sack. They are so large and top heavy that it is almost out of the question to carry them in the hand, so they are provided with a long, heavy cord of tapestry which is placed around the neck or thrown over the shoulder.



Tapestry Bag of Modest Proportions Worn in Accordance with the Latest Fashion



Earl

Baron

Marquis

Viscount

Duke

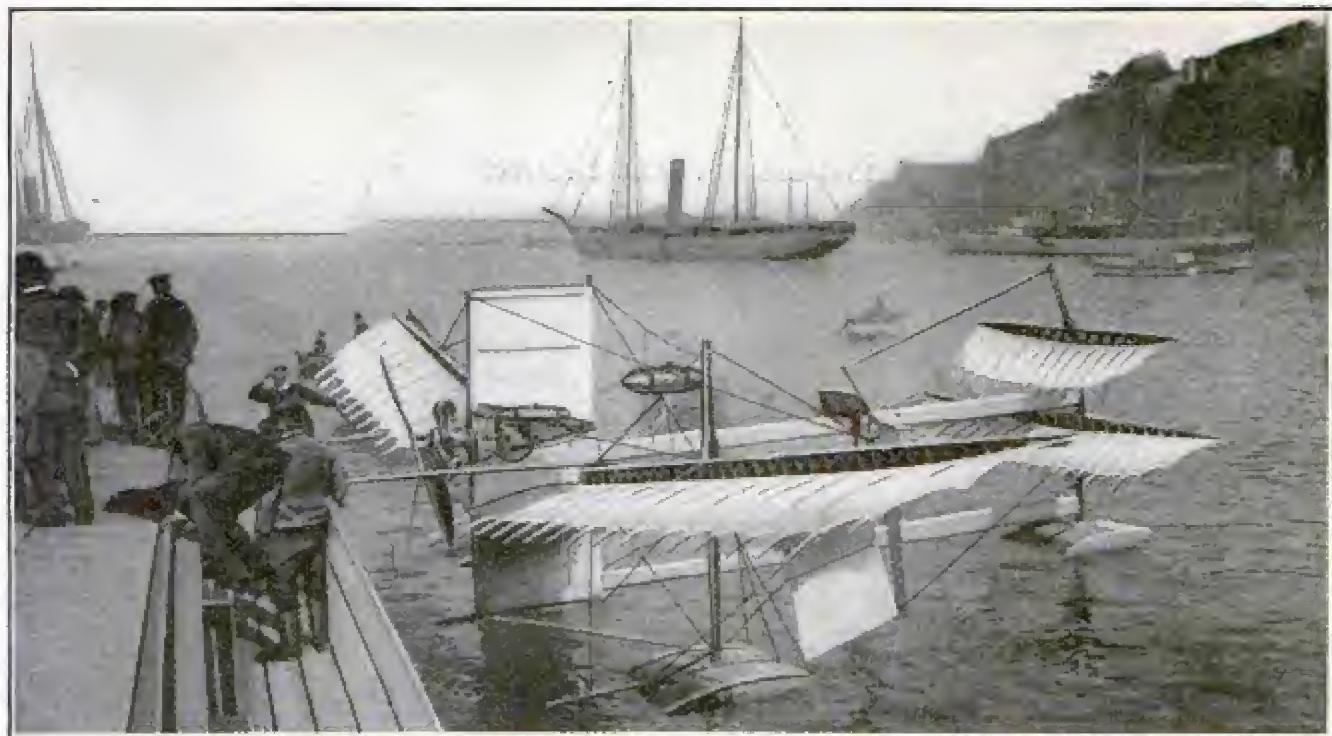
## CORONETS THE PEERS AND PEERESSES WEAR

The king and queen of England are not the only people who will have crowns placed upon their heads at the coronation ceremonies in London. Every one of the peers and peeresses of the realm will also be crowned, the difference in the coronations being that at the time the king and queen are invested with their royal diadems by high officials of state, the dukes, marquises, earls, viscounts and barons will each place upon their own heads the "circlet of gold" ornamented according to their ranks. Their ladies will crown themselves with similar circlets, of a smaller size, and equipped with hatpins to hold them in place. The highest order of the English peerage is held by the duke who wears a "circlet of gold surrounded by eight low points, each surmounted by a strawberry leaf." The marquis is similarly provided with "eight low points," but only four of these are surmounted by strawberry leaves, the other four being provided with pearls. The earl, on the other hand, has the "eight low points surmounted by strawberry leaves" but they must be small enough to permit

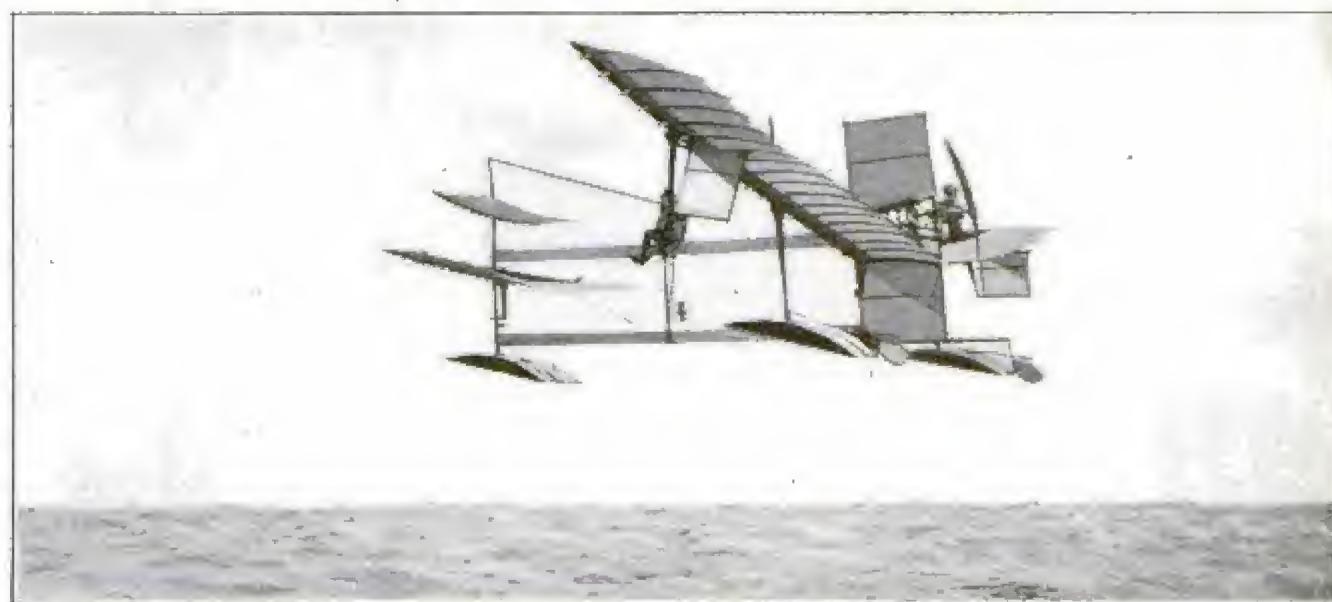
of being placed between them "eight lofty points or spines topped by pearls." The viscount is next in order and the relative subordination of his degree is shown in the fact that he is not permitted to have any "points" but is restricted to the use of 16 pearls "in apposition and close to the rim." The baron, the junior rank of peers, is permitted to use but six large pearls, "set directly on the rim but not touching one another."

## FRENCH AERO-HYDROPLANE

One of the several combination water and aerial craft entered for the motorboat exhibition races at Monaco this year was this curious French aero-hydroplane designed by M. Fabre. The wing surface was 258 sq. ft., the weight of the floats, on which the machine glides over the surface of the water, was 176 lb., and the total weight is 990 lb. It made some successful flights, arising from the water, but met with disaster one day when it alighted on the water too suddenly. The pilot was not injured.



The French Half-Water, Half-Air Craft, Which Attracted Attention at Monaco



Making a Successful Flight after Arising from the Water



The Result of Alighting Too Suddenly on the Water

## FINDING PLACE FOR AERO IN WORLD'S AFFAIRS

The freak age of flying is passing. Reckless airmen will continue to defy death for the plaudits of the crowd for years; the people will flock to such exhibitions as long as they are held; but the time has passed when the aeroplane created awe in the soul of the average citizen and the records that are yet to be made—that are now in the making—are those which have to do with the practical use of the machine, its application to commerce or as an aid to scientific progress. The men who have engaged in the exploitation of aircraft are redoubling their efforts to perfect a machine which will be something more than an adjunct to a circus or a county fair. They are realizing the possibilities the new science opens to them as rapidly as the progress of invention makes possible. From now on, it is safe to predict, the development of aeroplanes will be along lines calculated to secure them a permanent place in the work of civilization. At present the development tends to the adaptation of the machine to uses of war—the most primitive of the civilized arts.

The most startling exploit in the air during the past few weeks has been the accomplishment of a London-to-Paris flight of 250 miles without a stop. M. Pierre Prier, a French airman, performed this feat in a Bleriot monoplane which he drove at the rate of 63 miles per hour, making his journey from Hendon, a suburb of London, to Issy-les-Moulineaux, just outside of Paris, in 3 hr. 58 min. This is the seventh journey to be made by air route across the English channel, but it is the first trip between Paris and London without a stop. The journey made by M. Prier is covered by railroad and steamship a distance of 270 miles in about 6 hr.

Aside from the remarkable sustained flight of M. Prier, possibly the most important feat of recent months was the two days' flights of Captain Bellanger and of Lieutenant de Rose of the French army, from Pau to Paris.

In this trip, the officers covered a distance of 500 miles and during the entire time battled with head winds that tended to force them back. Some idea of how this handicapped them can be obtained from the fact that the last 155 miles were made by Captain Bellanger in 319 min. and by Lieutenant de Rose in 397 min. That this was remarkably slow time for the modern aeroplane can be understood when it is remembered that the same day the officers started on their journey, March 31, M. Pierre Vedrines flew from Poitiers to Paris at the rate of 94.54 miles per hour, the entire distance of 208 miles being covered in 2 hr. 12 min. This record was made by an airman alone in his machine. An interesting comparison with it is found in the flight of Lanser from Kiewit to Brussels, Belgium, with three passengers, a distance of 54 miles. The three passengers were sisters of the airman.

That the practical use of the aeroplane has not been overlooked by persons with evil designs is recorded in a newspaper dispatch from Geneva, Switzerland, which tells of the arrest of an Italian airman named Smeroglio who attempted to fly into Switzerland carrying dutiable articles. His machine fell on Mount Cenis, where the smuggled goods and the smuggler were taken into custody by the customs officers.

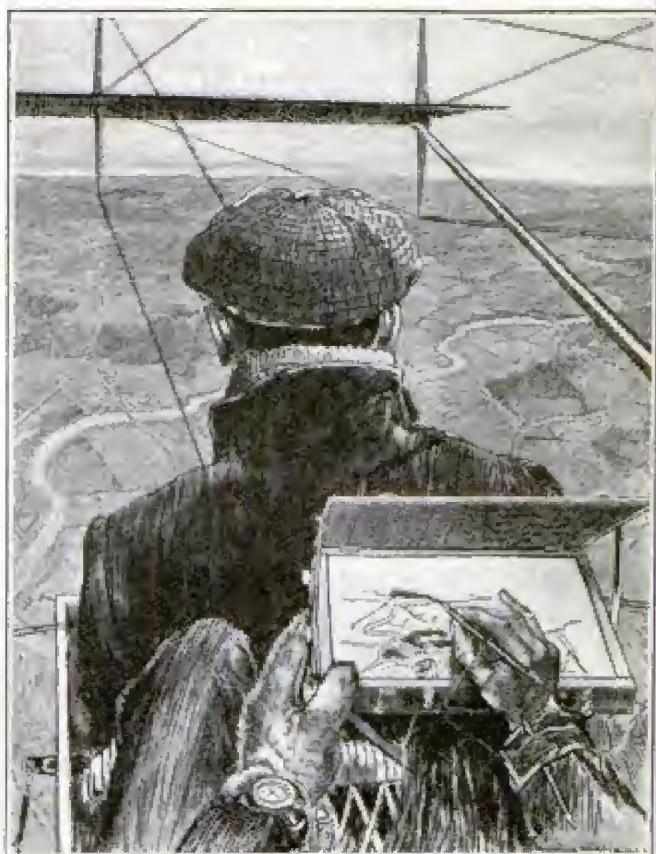
Captain Carron, of the French army aviation corps, died as the result of injuries received in an aeroplane accident near Versailles, France, April 18. He was making a cross-country flight from Villacoublay to Versailles. Flying at a height of 250 ft. something went wrong, causing his machine to fall. It turned over as it fell and the airman was pinned beneath the wreckage. Lieutenant Byasson of the French naval aviation corps, was another victim of the aeroplane. Lieutenant Byasson was in the air in his monoplane at Coignieres, France, when the machine turned a somersault and crashed to the earth on top of him.

## SCOUTING IN AN AEROPLANE

While the enthusiasts are declaring the day is not far away when the aeroplane will be a practical engine of destruction in warfare, there is no unanimity of opinion on the subject among scientists. There are many problems to be solved before the nations of the world will cease building battleships and turn all their navy yards into immense aeroplane factories.

As an aid to reconnaissance, however, it has proved its usefulness. The French army authorities have been training officers as aerial scouts for the past year, and a number of special devices have been evolved for this special work, such as means of communication between the pilot and the scout for giving directions, and utilizing the pilot's back as a rest for a small sketching board.

C. F. Williams, an artist of the London Illustrated News, recently made several experimental flights to prepare sketches and notes such as might be useful for military purposes, and he



Making "Military" Drawings while Flying in Aeroplane—Note Compass Attached to Wrist, Pencils Sharpened at Both Ends and Attached by Strings, and Novel Drawing Board and Wind Shield for Hand



"BROOKLANDS FROM THE DISTANCE"  
Facsimile of a Drawing Made by Artist C. F. Williams while Flying in a Biplane

brings out some very interesting and enlightening facts.

"My first flight was a short one," he writes, "and I made no attempt to sketch. When I was pulling my sketchbook and pencil out before starting for the second, Captain Wood (the aviator) viewed them with suspicion. 'For God's sake don't let that pencil go while we are in the air,' he said; 'if you do, we come down.' He explained that if it struck the propeller, the tips of which are running at 300 miles an hour, it would shatter the propeller to pieces. My sketchbook, too, needed a lot of clinging on to.

"From my preliminary flights, I saw that to sketch successfully on an aeroplane one must have: (1) A book or board firmly strapped to one knee; (2) several pencils, sharpened at both ends and securely fastened on strings—in the one case to avoid the necessity of using a knife for sharpening, and in the other to avoid all risk of dropping a pencil; (3) a wind shield to protect the hand; (4) a means of securing new paper without having to turn a leaf. I went back home and made a board, having the paper wound on two ratcheted drums, and passing over a hard surface for drawing on. It is somewhat similar to the principle of a kodak. It has a lid which can be fastened up with brass legs to act as a wind screen, and can be strapped onto the knee. Armed with this instru-

ment, I was enabled to work with something approximating comfort.

"I found considerable difficulty in being able to sketch fast enough to get even a hint of the country over which we passed, owing chiefly to the fact that we did not ascend high enough. From my experience, I should say that, for purposes of military route-sketching, a height of at least 2,000 ft. is necessary. However, from a height of about 500 ft., I was able to make more or less intelligible notes. For purely military purposes, the less there is in the sketch the better; but I endeavored to fill in my outlines as much as possible, simply to see how much I could do in the time. In a case where it might be desirable to make a sketch of a military encampment, the roughest sketch could be afterwards redrawn and perfected from memory.

"One difficulty I found was that, as the aeroplane circled round, my drawing would be in a different direction from that in which we were flying, and it is very confusing to have to reconstruct each line before you put it down. I should recommend that each aeroplane sketching-board should be held in such a way that it could be swiveled round at the direction of a small compass fixed to it. In that way it would be possible to circle round and round any spot, and make a drawing that would be integrally accurate in every direction."

## SHIP FIRES FOUGHT WITH CARBON DIOXIDE GAS

If the recommendations of the San Francisco fire chief are carried out, all fires in the holds of shipping in the harbor of that city will be extinguished with carbon dioxide gas instead of with water. The plan is to provide each fire-boat with a steel lighter equipped with large gas tanks and generators.

For the past year Fire Chief Murphy has been working with Professor O'Neil, of the University of California, on the idea. They have succeeded in

generating a carbon dioxide gas at little cost, which can be pumped into the hold of a vessel and will effectually extinguish the blaze with no damage to the balance of the cargo. The gas, being twice as heavy as air, forces the latter from the hold, thus smothering the fire.

Cargoes valued as high as \$2,000,000 enter the port of San Francisco, and in handling a fire that would actually do no more than \$10,000 of damage, goods are often destroyed to the value of ten times this amount through the necessity of flooding.

## SUFFRAGETTE SLEEPS IN A BATHTUB

A large number of the suffragettes in London refused to be counted in the census because, not having votes, they did not consider the country had any right to include them in its population. Many schemes for avoiding the census takers were resorted to, and a number of the well known suffragettes slept, on census night, in the homes of sympathizers who refused to fill up the forms. One of these houses was so crowded that one of the suffragettes had to utilize the bathtub as a bed.

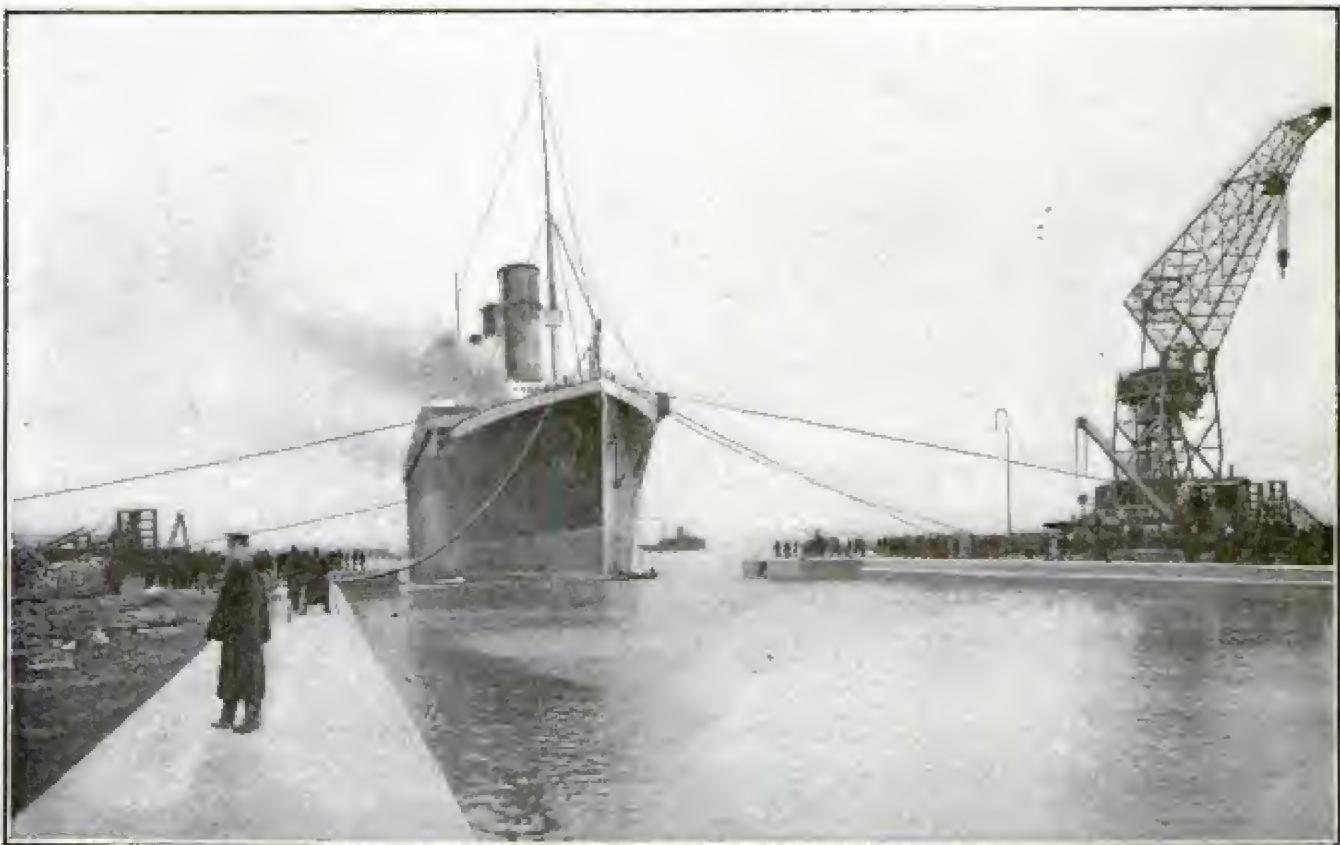


Suffragette Sleeping in a Bathtub So as Not to Be Counted in the Census Returns

## WORLD'S LARGEST SHIP IN BIGGEST DRYDOCK

The accompanying illustration is remarkable because it shows not only the "Olympic," which is the largest vessel ever built, but also shows her entering the largest drydock in the world, and the only one large enough for such a monster ship. The dry-

dock, which was built by the Belfast Harbor Commissioners at a cost of about \$1,600,000, is  $88\frac{1}{2}$  ft. long, with a breadth of floor of 100 ft. The "Olympic" with a length of  $882\frac{1}{2}$  ft. just slips into it. The construction of the dock is such that it may be lengthened 200 ft. at any time, should the dimensions of new ships launched require it.



The "Olympic" Entering the New  $88\frac{1}{2}$ -Ft. Drydock at Belfast

# How the Colors of Nature Are Reproduced in Moving Pictures

By J. Q. ROBERTS

FROM the old familiar yet ever wonderful rainbow to the latest and most remarkable application of color photography in motion pictures seems a far cry. Yet there is a close connection. It has long been known that the rainbow is caused by the shining of the sun on a mist or shower of rain, but it remained for Sir Isaac Newton, who discovered the theory of gravity, and who was a pioneer in many other branches of science, to show how it was formed. That was in 1675.

He passed a beam of sunlight through a glass prism, and the light came out in a band of various colors—violet, indigo, blue, green, yellow, orange, and red. These are the colors of the spectrum. When Newton placed a second prism behind the first in a reversed position, the various colors were brought back to a white spot on a screen instead of the gaily colored band. From that he concluded that white light was a mixture of lights of all the rainbow colors.

When the process of making black and white pictures by photography was invented men immediately turned their attention to the task of securing photographs in the natural colors of the objects depicted. Color photography may be said to date back to 1810. In that year it was discovered that if the "spectrum" or band of colors produced by the prism were thrown on moist chloride-of-silver paper and allowed to remain or "print" for 15 minutes, color changes could be recorded. Since then research in this branch of photography has led to

Sections of Films Showing the Development of Roses from Buds to Blossoms



These are Not Shown in Pairs as Used, But Merely Show Different Stages

many interesting disclosures. The discovery of the power of certain dyes to render the photographic plate sensitive to all visible colors was the one step needed to make color photography and color printing possible.

It is known, therefore, that ordinary white light consists of a large number of colored lights, which, meeting the eye together, produce the sensation of white light. The colors of the spectrum, as given above, are seven, although in reality there is an enormous if not an infinite number of distinct colors in it. These colors are frequently called the primary colors, and other tints and shades are producible by mixing them; but in a stricter sense the primary colors are three in number, namely, red, green, and violet (or blue). These three colors or kinds of light cannot be resolved into any others, while a yellow ray, for instance, can be resolved into a red and green, or can be produced by the mingling of red and green light, consequently yellow is not now regarded by scientific men as a primary color. Inasmuch, however, as a yellow and a blue pigment will always produce a green when mixed, red, yellow and blue are still, in a sense, regarded as primary.

Just as the invention of photography in black and white spurred scientists on to find a means of taking colored photographs, so the extraordinary popularity of motion pictures led to innumerable attempts to still further strengthen the illusion by representing

moving scenes in colors on the screens. Single colored photographs are now secured by means of plates covered with pigment dyes, but this method is impossible under the conditions involved in the taking of motion pictures. Many films have been stained by hand, but the work is so tedious and the result so unsatisfactory and unreal that this method has never become popular. When it is considered that many films are 1,000 ft. long and contain over 16,000 separate pictures, it can be seen that the time and expense required to color them by hand make this process impracticable.

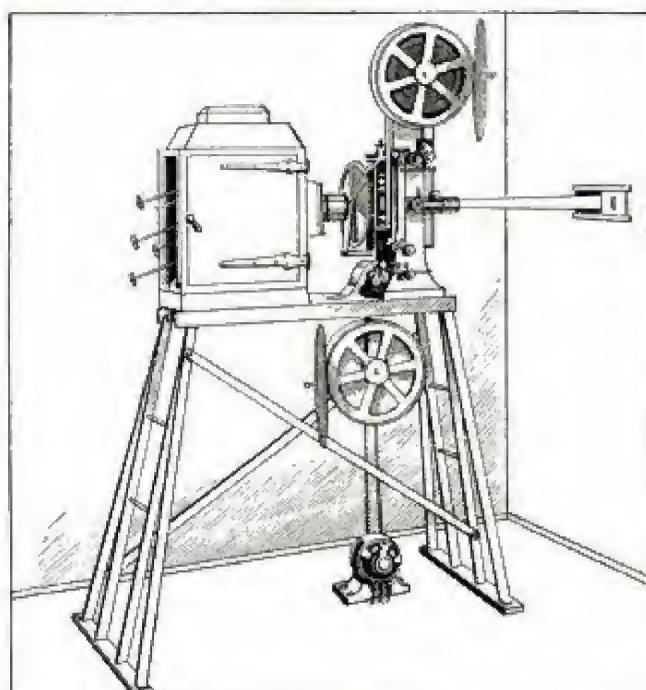
Charles Urban and G. Albert

Smith, two Englishmen engaged in research along this line, recently brought out a method of projecting motion pictures on a screen in colors which resemble natural colors to a remarkable degree of perfection. It was first done by the use of "color filters," red, blue,

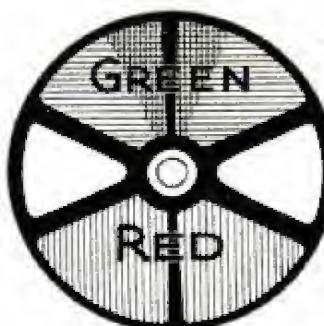
and green glasses which absorb all the red, blue, or green light passing through them. This same method has been used for some years in taking colored photographs and is the basis of the three-color printing process.

Later improvements reduced the number of color filters to two, red and green,

the green filter used being one which transmits a considerable amount of blue light. With the two filters reds and greens and their orange and yellow combinations as well as browns, grays, and even blues and indigos, are brought out. This process has



Special Apparatus Arranged for Projection of Pictures in Colors, Showing How Red and Green Filter is Placed in Center



The Rotary Color Filter

been called the "kinemacolor" process. It depends upon what is known as the "persistence of vision." When a lighted stick is whirled around, it forms to the eye an unbroken circle of fire. The first impression of the moving object melts into the next impression. Probably the application of this principle to the moving picture is better illustrated by the familiar colored top which carries a card divided into sections painted blue, green, and red. If the top be spun rapidly, each color fuses into the next and a combined sensation of white appears to the eye.

The camera used in this process is somewhat similar to the ordinary moving picture camera. It moves twice as fast, however. While the ordinary camera takes 16 pictures a second, the "kinemacolor" camera takes 32. The essential difference between the cameras is that the latter has a rotating color filter which is placed between the lens and the shutter. This filter consists of a skeleton wheel having one segment filled in with red-dyed gelatine and a similar one filled with green-dyed gelatine, and is so geared that the exposures are made through the filters alternately. The film, when exposed, is developed, and a positive film made from it. If the negative film be examined, it will be found to con-

sist of images in pairs which differ from each other inasmuch as they are records of the red and the green, respectively, in the object photographed.

In the projection of the pictures also the rotary color filter is used and is made to synchronize with the film. When the two pictures are rapidly projected one after the other onto the screen the combined effect gives rise to red flowers and green leaves. If the positive film is placed in the wrong order, i. e., the "green" picture opposite the red light, the colors would be complementary ones all through. In order to prevent mistakes the edges of the films are marked.

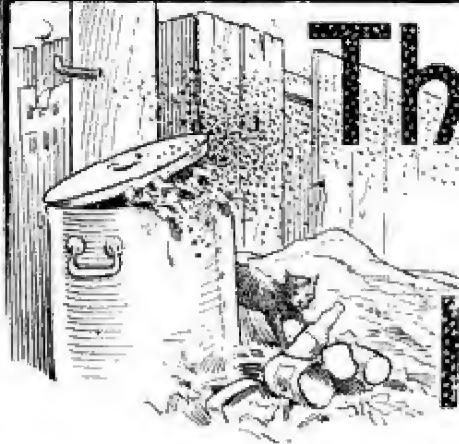
The cover design on this issue of Popular Mechanics Magazine is not, therefore, a true representation of the "kinemacolor" film, but has been colored as it would appear on the screen at certain parts of a film which shows the development of a rose from the bud stage to the blossom. This film was taken by a series of exposures, made about every four minutes and a half, extending over a period of three days. There were about 1,000 pictures on the film, which is run off at the rate of 32 a second. When viewed as it is thrown on the screen by the projector the result is astonishing, for the three days of growth are visualized in fewer minutes.

### A WHISTLING WELL

A resident of West Seattle, a suburb of Seattle, Wash., has in his back yard a whistling well which predicts changes of weather instead of gushing water. With the intention of boring for water this man drove a drill 153 ft. below the surface. The well was abandoned at this depth because no water was in sight. Later the owner noticed that the pipe which capped the bore was spouting wind with considerable force, making a peculiar whistling sound. At other times the pipe seems to suck in wind. By observation it has been found that the expul-

sion of air precedes a storm of some sort and the influx of air a change for the better. This natural barometer is explained on the theory that the bore has penetrated a cavern of some size and that the air beneath the earth is driven out when the atmospheric pressure lessens and flows back when the pressure becomes heavier.

A committee has been formed in Chicago charged with the duty of collecting a fund of \$100,000, and completing arrangements to hold a big aviation meeting at Grant Park, on the Chicago lake front, some time during the summer.



# The Other Side of the Fly Question



Fly is of Extreme Value as a "Danger Signal" to Indicate the Presence of Unsanitary Conditions, and It is These Conditions and Not Primarily the Fly Itself Against Which We Must Wage War

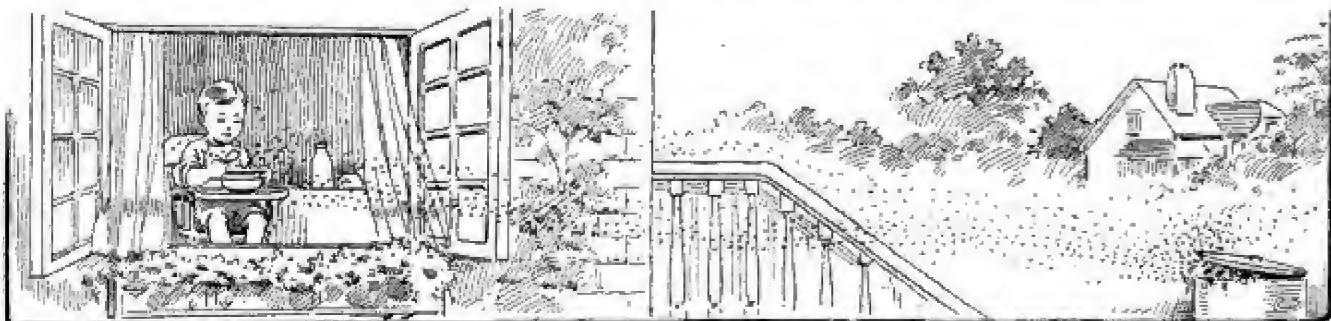
JUST about this time of the year there are many injunctions in the public press to "swat the fly," with a promise of the most direful results if this warning be not followed. But few people know much about the real truth of the fly question, beyond the fact that the house-fly is a carrier of the germs of certain diseases, such as typhoid fever, intestinal disorders and tuberculosis, and it is with a view to presenting the why and wherefore of the fly that the following remarks, compiled from opinions specially written by some of the greatest entomologists on the North American continent, are set forth.

One question that will naturally occur to the thinking person is: "If the fly be exterminated, supposing that were possible, would it tend to upset the 'balance of nature' and result in some other plague that might be even worse than the flies themselves?"

Similar things have happened before. The decimation of the coyotes resulted in a plague of gophers. The mongoose was practically exterminated

and the rats multiplied so as to become a menace. The weasels were killed off and the rabbits overran the countryside and ate up every green thing in sight. The English sparrow was imported to destroy the measuring worm and now people are wondering how to kill off the sparrow which has increased so alarmingly as to become a pest. In northern China the wolves kept down the marmot or land otter, but when the natives waged war on the wolf the marmot increased and spread the plague.

These are but a few instances out of many that could be quoted. Is a similar parallel possible in the case of the fly? Most of the experts say no, but Dr. E. Porter Felt, State Entomologist of New York, at least admits that there may be. Says Dr. Felt: "There is a possibility that a biting, dung-breeding form, such as the stable-fly, might, in the event of the disappearance of the house-fly, become dominant, and, with a following modification in habit, inflict more serious annoyance upon mankind and possibly



be equally as efficient as a carrier of disease. Potentially speaking, a number of species might take the place of the house-fly (some perhaps unknown at present) and we have no assurance that any one of these would be less objectionable to mankind."

And it may be said that there are other people who see the matter in this light, and they are not without plausible arguments to back up their contentions. For new species of animals, plants and insects are continually being evolved, and existing species are changing their habits to suit altered environments, as the sheep breeders of Australia know to their cost. In Australia there is a certain bird that kills sheep to eat a certain part of the back of the animal, which, from a height, resembles a vegetable growth that formerly comprised the bird's natural food. And Civil War veterans will remember with a shudder a certain fly which laid its eggs in the wounds of any unfortunate who happened to be overlooked for a few hours on the field of battle, and caused most horrible torment until the developing insects were painfully extracted by the surgeon's knife.

To return to the house-fly, it may be asked: "Has this insect any real function in the scheme of nature?" And all the experts answer in the affirmative. Quoting Dr. L. O. Howard, Chief of the Bureau of Entomology, U. S. Department of Agriculture: "The house-fly breeds only in fermenting organic matter. Its larvæ, therefore, act to a certain extent as scavengers. . . . The larvæ, moving in an excrementitious mass, accelerate putrefaction and help the spread of the putrefactive germs throughout the substance."

Dr. John B. Smith, Entomologist, New Jersey Agricultural Experiment Stations, puts the same thing in a somewhat different way. "The campaign," says Dr. Smith, "is not so much against the fly as it is against the conditions which require the presence of the fly as a natural scavenger. . . . The fly is man's good friend and a nec-

essity so long as man is a filthy animal. When he becomes a clean pig the flies will naturally disappear."

Perhaps, however, the value of the fly in destroying dung and similar matter is somewhat overrated, for, as is stated in a bulletin issued by the New York State Museum, it has been estimated that 1,200 house-flies might be bred from 1 lb. of manure, and at this rate a good load would produce two and a half million!

From all of which it would seem that merely killing off the flies by "swatting," by fly-papers, fly-traps and the like, is of no avail in the aggregate. To destroy the insect effectually requires the abolition of its breeding places. The filth in which the fly deposits its eggs is the dangerous thing, probably more so than the flies themselves. As Dr. C. Gordon Hewitt, Dominion Entomologist, Canada, puts it: "House-flies indicate the presence of refuse, garbage, and other unsanitary conditions. The house-fly is useful therefore; it is of the greatest use as a danger signal, as a 'red flag.'" And then he pertinently adds: "But we should not require danger signals in such enormous quantities!"

Prof. S. W. Williston, of the University of Chicago, points out that the fly is purely a domestic product, like the dog, the sheep and the ox, and that it would become extinct should man cease to exist. It is never found far from man's habitation, and there are many places, as in the Rocky Mountains, where a house-fly would not be found in hours of search. Thirty years or so ago, says the professor, the fly was unknown even on the plains, where now it exists in unnumbered millions.

Thus it is not the fly which is primarily to blame for epidemics of typhoid fever and the like. It is man's segregation into cities and towns where he has not provided himself with the requisite sanitation. If the *cause* of the fly be removed, the fly will disappear, largely if not entirely, and the probability is that if in some miraculous way we could exterminate

the fly without removing the cause, there would be something worse speedily develop to take its place.

It might not be amiss to add that on one occasion, the fly—probably the stable-fly—besides fulfilling his mission as a “danger signal,” performed a real and valuable service to the people of this country. It happened in the stirring times of '76, when the patriots were assembled in Philadelphia to debate whether or not this country

should declare its independence. Several delegates, more cautious or fearsome than the rest, were holding out against the Declaration. It was then that a swarm of biting flies, settling on the unprotected stockings of the colonial fathers, speedily forced the delinquents to make up their minds and even to risk their precious necks (should they be beaten in the struggle that followed) rather than be slowly eaten alive by the insect pests.

### DECIPHERING WRITING ON BURNED MANUSCRIPTS

The processes of color photography have recently been applied to obtain a legible photograph of the writing on burned manuscripts which were unreadable by any other known means. As long as the sheet has not been entirely disintegrated, positive results can be obtained every time.

The charred manuscript is carefully arranged, in as near its original shape as possible, on a sheet of glass, and covered with a drying varnish, after which it is backed by another sheet of glass. By using carefully selected color screens, and orthochromatic plates (which can be obtained from any good photographic supply house), a perfectly legible photograph of the writing may be taken, although there may be no marks on the charred remains that are visible to the eye.

This is the only known method that will give results when the writing has been made with vegetable inks. Ordinary photography, however, can be used successfully when the ink contains aniline or iron in its composition. Pencil writings should be photographed with the objective inclined on its axis so as to produce the proper reflection of light from the graphite marks.

### CHILDREN AS AEROPLANE PASSENGERS

Considerable protest is being made in Europe against the growing practice of loading an aeroplane with children instead of adults when an attempt to



M. Breguet and His Passengers, Most of Whom are Children

establish a new passenger record is being made. Children do not weigh as much or take up as much room as adults, and, naturally, more can therefore be carried, but should an accident occur, the offending airman would very justly be accused of sacrificing children to his desire for a record.

Two recent records were made by M. Breguet and M. Sommer, the former flying six miles with 10 passengers, and the latter taking up 12 on his machine. All but three of M. Breguet's passengers were children.



Remarkable photograph of the Atlantic liner, "Prinzess Irene" as she lay on a sand bar off Long Island, April 6. The ship, with 1,700 passengers and a large cargo, ran aground in a fog at 4 o'clock in the morning. All her passengers were taken off and part of the cargo removed before the vessel was released. She was practically undamaged.

## LARGEST FREIGHT-SORTING YARD IN THE WORLD



**Chicago's Great Freight-Distributing Yard.** The "Hump" is Shown in the Middle Foreground, and the Man in the Switch Tower Electrically Controls the Switching of the Cars to Their Proper Tracks

Chicago's phenomenal growth and its undisputed position as the greatest railroad center in the world have long called for a freight-handling yard outside of the congested part of the city in order to release valuable land for other uses and to expedite and lessen the expense of the handling of the four to five million railroad cars that are distributed yearly by the 23 trunk lines entering the city.

This is the way the interchanging problem has been worked out: At a point midway between the ganglia of east and west trunk lines, and between the two main belt lines, the Chicago Union Transfer company laid out a set of tracks which are designed to serve the same purpose as the shelves of a ware-



**The Cars on the Tracks, Sorted without a Switch Engine and without Risk to Life or Limb, Ready to Go Direct to the Railroads Which Are to Take Them from Chicago**

room, upon which are sorted out the various kinds of merchandise in stock. The tracks are in two sets connected by main tracks on an elevation. From the main tracks run main sidings like the veins of a leaf, and branching from these lateral veins are other parallel tracks into which, in the sorting process, the cars belonging to each road are sent, ready for delivery.

The sorting process is accomplished by the uncoupling of a car from a train standing on the elevation between the two fanlike sets of tracks. The car is uncoupled, given a push, and rolls down the decline, destined for a certain one of the branch tracks off from the main laterals. A brakeman on the car and the operator in the tower over

the elevation—"hump," it is called—do it all. As if by magic one switch after another opens as a car approaches, and closes when it has passed. These switches are operated by electricity from the tower, and all the operator has to do is to press the button, properly labeled, and the switches silently guide the car into its destined stall.

It is all very expeditiously done. A train from east or west rolls up on the main tracks of the "hump" and stops. The cars of the train from the east are sorted into the storage tracks at the west, and the cars of the train from the west are sorted into the tracks at the east. Without a switch engine, without the bumping and puffing, and without the risks to life and limb that

attend switching in the downtown yards, the cars are assorted and made ready to go direct to the railroads which are to take them outbound from Chicago.

In constructing this switch yard, the "center of gravity" of the transportation of Chicago was first estimated, and about this the clearing yards were built. Prairie to the extent of 5,000 acres was purchased, and the foresight of the designers was evidenced by the fact that provision was made for towns and industries that were expected to follow the improved railroad facilities. The towns of Argo and Clearing, unknown a few months ago, are evidence of the fact that this pre-judgment was not misplaced.

## WONDERFUL RESUSCITATION APPARATUS

To bring back life when all other methods have failed is the claim made by the Bureau of Mines for a wonderful resuscitation apparatus recently added



The Pulmotor at Work near One of the Rescue Cars

to its equipment. It is called the "pul-motor," is of German origin, and was but little known in this country until taken up by the bureau. Today it is installed in all the rescue cars and at all the rescue stations, and the records of the bureau give evidence of instances where men, pronounced dead after exhaustive resuscitation efforts, have been literally snatched back to life.

The parts of the apparatus consist

of a cylinder for the storage of oxygen up to a pressure of 125 atmospheres, a blowing and suction valve, actuated by two accordion bellows, a face mask which encloses the mouth and nose, and two flexible tubes leading from the mask to the two bellows. After the mask is placed on the face and made air-tight, and the air turned on, the apparatus works automatically. Oxygen is forced into the lungs until a certain pressure is reached, then the elongation of the accordion ceases and it collapses, a valve starts the other accordion and the lungs are emptied. A lever permits the oxygen to flow in and out.

There are on record two instances of the remarkable efficiency of the apparatus. In one, the rescue car arrived 26 hours after the accident at a mine where an explosion had killed 150 workers. The rescue corps found the body of a miner near the entrance of the mine ready to be moved away with the dead, and, although physicians insisted no spark of life remained, the pulmotor was set to work. Resuscitation followed and the man is alive today. In the other instance, three men were laid aside as dead following

an explosion of dust in an Ohio mine. Again physicians, judging from the ordinary tests, declared the cases hopeless, but after three hours' treatment by the pulmotor the men recovered.

### REMARKABLE NEW FILTER

Perfect sterilization of liquids by means of filtration only seems to be made possible on a large scale, through a process, originated by two French scientists and reported to the Academy of Sciences at a recent meeting. It is known that membranes of collodion have the property of retaining all the microbes in a liquid filtered through them. But they are very fragile and therefore impractical outside of the laboratory. By reinforcing the collodion membrane with a fine wire screen imbedded in it, just as a pane of glass is thus reinforced, the two scientists constructed a filter, not only strong enough for practical purposes, but so effective as to exclude even molecules of salts dissolved in the liquid.

### CAMERA SHOT INTO AIR MAKES PHOTOGRAPH

A remarkable method of making bird's-eye photographs and one of the photographs so taken are shown in the accompanying illustrations. The camera, which is called a "gun camera," is shot several feet into the air



Photograph Taken by Gun Camera of a Group Watching Its Flight; Note the Fore-Shortening of the Bodies



Shooting the Gun Camera into the Air

from the top of a standard in the head of which is an explosion chamber. The camera is set to expose from 1 to 10 seconds after the explosion, when it reaches its full height. It must be caught in a net when it comes down, to prevent it from being smashed.

### GIRL ORGANIZES FIRE DEPARTMENT

Port Tampa, Florida, is to be protected from fire by a brigade organized and trained by the daughter of the late chief of the Tampa fire department. This girl, Maggie Harris, is said to be the first girl in the United States and probably in the world to organize a fire department. About 40 men have agreed to serve under her direction. She is drilling them according to the rules and methods of her late father.

Of the 7,500,000 telephones installed in the United States, 500,000 are located in hotel bedrooms.

### NEWEST OUTDOOR SPORT COSTUME FOR WOMEN

The costume shown in this illustration is announced as the ideal for the modern athletic woman, whether her



**Ready for Aerial Trip, Cross-Country Tramp, Motor-cycle Trip or a Brisk Canter**

steed be an aerial one, a horse or a motorcycle. It is also suitable for cross-country tramps, especially if the ground be rough or hilly. The costume is made of strong mohair, and the cap is attached.

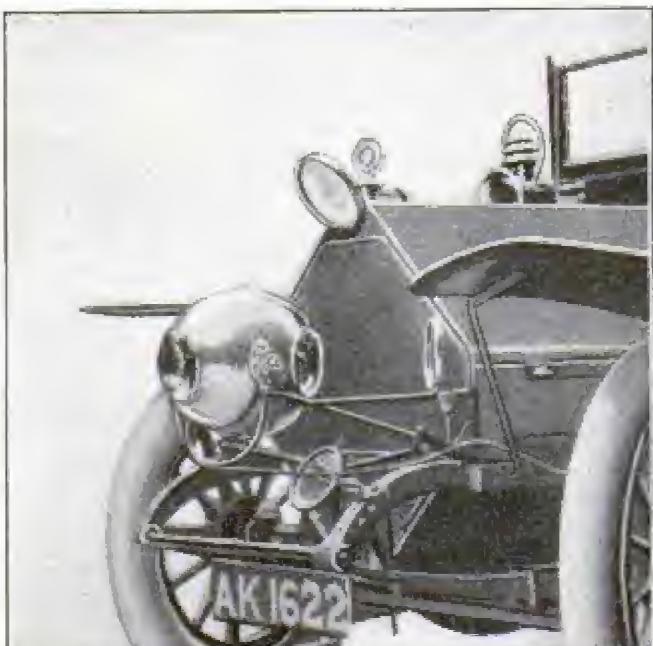
### REMARKABLE RESUSCITATION FROM ELECTRIC SHOCK

A remarkable case of resuscitation from apparent death caused by an electric shock is reported from Europe. A linesman accidentally took hold of one of the high-tension wires of a 7,500-volt 55-cycle circuit; several minutes elapsed before the line was disconnected; about 15 minutes before the linesman was found, and at least half an hour before he was brought to the

ground. In all about 50 minutes elapsed from the time of the shock until the first efforts at resuscitation were made. When brought to the ground the victim showed absolutely no signs of life, and the attempts to produce artificial respiration by movement of the arms, etc., were without effect. Then it was recalled that instructions relating to the tongue had been neglected, whereupon the mouth was forced open and the tongue pulled out and allowed to recede rhythmically. The patient responded almost at once, began to breathe, and after two hours had not only gained consciousness, but, with the exception of a few burns, was in a normal condition.

### ENGLISH LAMP REDUCES BLINDING GLARE

Relief from the dangerous and dazzling glare of the automobile headlight, now under the ban in many American cities, is promised by the invention of the new lamp shown herewith. The metal globe containing the lamp is furnished with four lenses, through which the light is thrown upon four reflectors at the angles of the surrounding frame. By this indirect distribution of the light, the requisite illumination is given without the glare.



**New Automobile Lamp That Prevents Glare by Deflecting Dazzling Rays to Four Reflectors**



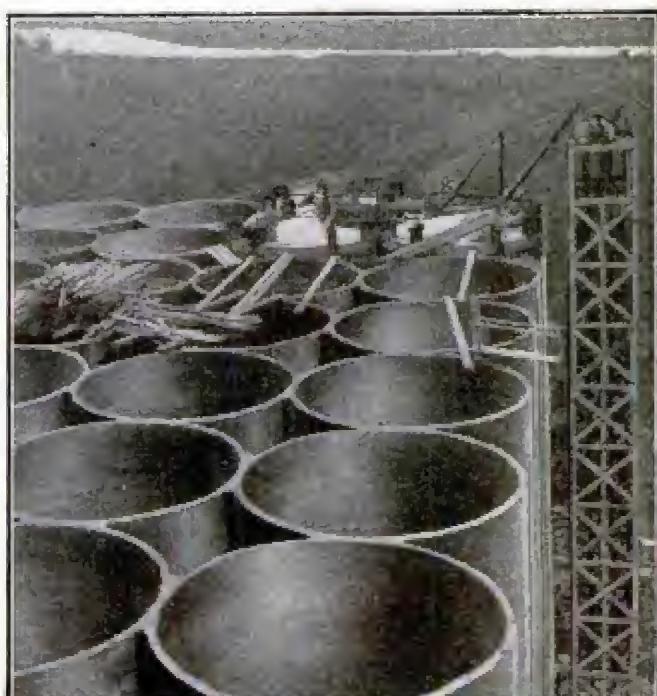
**Fort William Reinforced Concrete Grain Elevator. Working House on Right, Storage Bins in Rear**

## LARGEST GRAIN ELEVATOR BUILT OF CONCRETE

Almost half of the crop of Minnesota, the country's greatest wheat producing state for 1910, could be stored in the big elevator that has recently been constructed at Fort William, (Ont.) Canada, entirely of reinforced concrete. With its total capacity of 40,000,000 bu. and the scheme of building left so open that bins for storage might be added to care for an indefinite quantity of the great staple, the Fort William structure is what engineers believe to be one of the most important examples of reinforced concrete work of the present day.

It would require the cultivation of nearly 3,000,000 acres of land with an average yield of 13.8 bu. per acre (the average yield in the United States for 1910) to fill this monster storehouse. The Minnesota 1910 crop of 94,080,000 bu. would fill the bins twice and leave a bit for other elevators. The second largest crop, that of Kansas, with 61,660,000 bu. would only fill it about one and a half times, while the Illinois

crop of 31,500,000 bu. would leave plenty of room for a few of the smaller states.



**Grain Bins in Fort William Elevator before Cupola Was Put On, Showing Interstices Between Bins Where Grain Is Also Stored—From Photograph Taken before Superstructure Was Built.**

Work on the big elevator was commenced late last fall with the sinking of 12,000 piles upon which the concrete base that forms the foundation was laid. The weather was extremely cold during the time the foundations were being prepared, the thermometer registering as low as 55 deg. below zero on one day. One of the workmen was frozen in going from one section of the site to another. The elevator is built on the delta formed by the Kaministiquia and Mission Rivers, near Lake Superior. A concrete wharf, 337 ft. long and 12 ft. wide, forms the water front and there is sufficient depth of water for the largest of the lake freighters to lie alongside.

All of the storage bins planned have not yet been completed. The principal section of the building is the working house which adjoins the wharf and

which includes the 75 circular concrete bins arranged in five rows of 15 bins each. These bins have a diameter of 12 ft. and are 79 ft. high. There are five rows of these giant cylinders and in order that no space may be lost the interstices between the cylinders are used for storage purposes also. Above the bins is a steel cupola, 85 ft. high. The storage section of the plant consists of 70 circular concrete tanks arranged in ten rows. They have an inside diameter of 23 ft. 3 in. and rise to a height of 95 ft. The interstices between these tanks are also used for storage. Between the storage section and the working house is a track shed, a steel frame structure, 68 ft. wide by 240 ft. long, where, under normal conditions, 200 freight cars may be received and unloaded in 10 hours or 500 freight cars in 24 hours.

## ELECTRICITY HEATS RUGS WITH WOVEN WIRES

A gentle warmth may be secured from rugs by a new invention for weaving fine, insulated wire into the fabric of the material. By means of a suitable electric connection, every particle of the rug is electrically heated to a desired temperature with no danger of burning or shock.

The ordinary electric heating pad has a few wires heated to a comparatively high temperature. The new electric heating fabric has a fine wire in every

thread, and the temperature is not excessive. Each thread has a core of wool around which is wound spirally a thin flat braid consisting of several fine wires of pure nickel. Over this is braided an insulating covering of wool, silk or cotton. The thread thus produced is flexible enough to be woven into textile material. The electric resisting properties of the nickel wire make the temperature practically self-regulating.



Rugs Woven from the New Electric Heating Fabric



Bed Comforter and Other Conveniences Made from the Fabric



A Fist Studded with Apache Rings

Vicious Ring Used by Apaches

How the "Thorn Punch" Is Used

### FINGER WEAPONS OF THE PARISIAN APACHES

All the weapons used by the Apaches in Paris are unique, but none are more ingenious than these curious rings and the device known as the "thorn punch." The latter, held as shown in the illustration and delivered with a hard, straight blow, would drop a man as if hit by a sledge. The rings, however, are more subtle, as they appear to be nothing more than ordinary finger adornments provided with the exaggerated settings or heads often worn by fad extremists, but hidden within the hand is an extension. This rests against the palm when the fist is doubled and adds much to the force of the blow.

### USING PICTURE TILES TO EDUCATE THE YOUNG

The instruction of children finds one of its most modern expressions in the fittings of the Carnegie library in Cleveland, Ohio, where mantel tiles to represent stories told the children have been introduced in the room devoted to the younger readers. A photograph was recently made of one of these mantel picture-stories representing a series of La Fontaine's Fables. There are seven distinct stories in the mantel tiles shown in the photograph and these

stories are told to the children as they view the illustrations. The tiles are so placed that they may be taken out and sent to the branch libraries to be put to the same use. There are numbers of sets of them, all illustrating



Mantel Tiles That Illustrate Stories Told to Children

well known stories. The tiles are in bright colors and are usually the work of some distinguished artist.

A wireless apparatus, consisting of a special head telephone receiver and a detector coil, has been devised to locate the exact position of iron pipes without unnecessary digging. An electric current is passed through the pipe, and the electric wave thus produced is picked up by the apparatus.

### ASIATICS LARGE AND SMALL

The man at the left of this illustration is one of the largest in India and



Courtesy The Sphere, London

A Giant 7 Ft. 9 In. in Height and a Midget 2 Ft.  
4 In. High

the one at the right is one of the smallest. The huge human being, who is known as the Kashmir Giant is 7 ft. 9 in. in height, and the smallest figure, known as the Patiala Midget is but 2 ft. 4 in. high. The Englishman is of the average height and the other two men belong to a diminutive race. Both the Giant and the Patiala Midget are 23 years of age.

### LIZARD THEORY SETS OIL OPERATORS AGOG

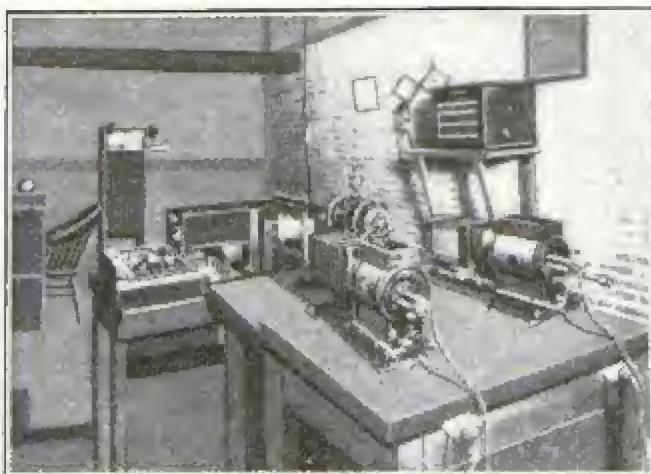
Oil operators are enjoying what they believe to be a joke perpetrated by one of their own kind who has solemnly asserted that the deposits of oil found in various parts of the United States are the direct result of the decomposition of some form of lizard which inhabited the earth at a prehistoric period. According to this investigator, who sets forth his findings in the most serious fashion, the lizards inhabited a vast

inland sea that extended from the Alleghenies to the Rockies. He believes these reptiles were from 40 to 80 ft. long and weighed many tons each and were largely composed of fat. When the upheaval took place which threw the plains above the water, all the creatures that were its inhabitants took refuge in pools and the water in these was gradually evaporated. As this water was being evaporated the lives of these amphibious animals were sacrificed and the fat was literally boiled out of them. The oil rose to the surface and was covered with a layer of dust and sand that became so heavy it sank. In the meantime other lizards were being boiled out and a new layer of oil formed on the top of the water, which collected its stratum of dust and sand and sank on top of the first, thus forming the successive layers of oil-bearing sands and oil pools. The operator who set forth this theory declared he believes some of the lizards were big enough to produce from 300 to 1,000 bbl. of oil.

### WIRELESS INTERRUPTS LIGHTING CIRCUIT

The wireless-telegraph installation of two Denver boys is held responsible for queer interruptions of the electric lighting circuits in the neighborhood in which they live. At a certain hour on several evenings the fixtures in nearby houses began to sizzle and pop, and the lights to go out. Subsequent investigation proved that these occurrences took place when the wireless apparatus was started working. The apparatus derived its power from one of the electric company's feed wires, and the "kick back" current was the cause of the trouble.

According to the Electrical World, an electrician successfully relieves the croupy coughs of his young son by placing an electric water heater inside the crib and then inclosing the crib. The steam rising from the heater moistens the air.

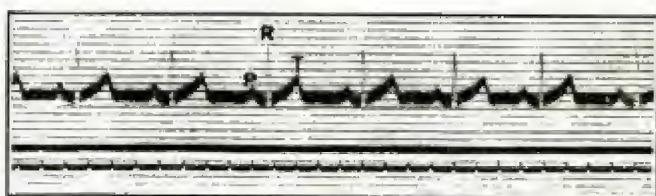


**View of "Heart Station"—The Light from the Two Arc Lights in the Foreground Passes Through the Galvanometers on the Second Table, Projecting the Shadows of the Fibers onto the Photographic Apparatus in the Background. The Switchboard on the Shelf Serves to Connect and Control the Current Coming from the Patient**

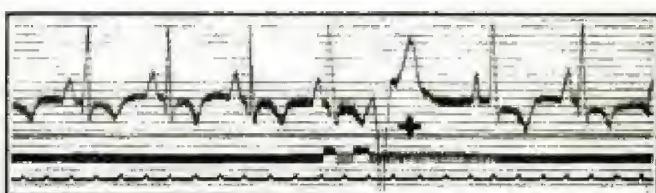
## THE WORK OF THE

In past generations members of the medical profession depended entirely upon their own senses to detect the symptoms of disease, but the present age of machinery has had its effect even in this branch of science. This is shown by the gradual development of instruments of precision for noting the minute changes which take place in the human body. In the study of the heart, more than any other organ, these means are now utilized to a very great extent. We have instruments for accurately determining the blood-pressure that the heart is maintaining, others which record on paper, in the form of curves, the feeble pulsations of the arteries and veins of the neck and wrist, and by the use of the X-ray, the size, shape, and contraction of the heart itself can be observed and recorded.

For more than half a century it has been known that every muscular movement, including the rhythmic muscular action of the heart, liberated small electrical currents. The problem has been to obtain some means to record these currents, as they would give a very valuable clue to the many changes which might take place in the contraction of the heart. Therefore men of science have for many years been trying to devise some instrument which would serve this purpose. It remained



**Curve of Normal Heart Action Showing P, R and T Waves. Lower Line Marks Every Fifth of a Second**

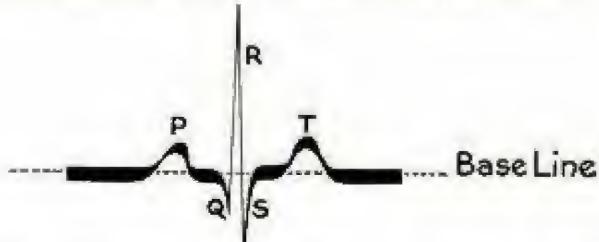


**Cross Shows Abnormal Heart Beat, Causing Irregularity. The Other Beats are Also Abnormal**

## "HEART STATIONS"

for W. Einthoven, a Dutch physiologist at Leyden, to supply this need, when he devised, in 1903, what is termed the "string galvanometer." This forms the essential part of the "electrocardiograph" as the apparatus for recording the heart currents is called. In the past two years so-called "heart stations" where this work is done have been established in four places in this country: One in Baltimore at the Johns Hopkins hospital and three in New York at the Presbyterian, Mt. Sinai, and Rockefeller hospitals.

The string galvanometer is very simple in principle, though complex in con-



**Schematic Drawing Showing the Waves Which Occur during One Contraction of the Heart, and Their Lettering. Ordinarily Q and S are not Present in the Curves Obtained from Normal Individuals**

struction, and is based on the physical law that whenever a current passes through a magnetic field, it is deflected to one side or the other, depending on its direction. If some medium which has little weight can be used as the conductor, it would consequently be de-

flected along with the current. For this purpose a very delicate fiber of platinum or quartz (silvered so as to conduct) is hung in the magnetic field of two powerful electromagnets and is attached at its two ends so that it vibrates like the string of a musical instrument. From this the instrument derived its name. The fiber is about 3.5 in. long and varies in diameter from 1-2500 to 3-2500 of an inch, while its estimated weight (it cannot be weighed even with the most delicate of balances) is about .000004 of a gram. It is finer than the most delicate cobweb and can only be seen with the naked eye when a strong light is thrown upon it so as to catch the reflection.

In order to see and record the minute vibrations of this fiber to the currents which are passing through it, it must be magnified about a thousand times. To do this, the light of a very powerful arc lamp is focused down on the fiber by means of a microscope. This produces a shadow of the fiber on the opposite side and this is enlarged and projected by another microscope to a screen about two yards away. Here the fiber appears as a black line about  $\frac{1}{8}$  in. wide, and its vibrations are from  $\frac{1}{2}$  to 1 in. in either direction. If one wishes to make a permanent record of the vibrations, a special type of photographic apparatus is placed in the position of the screen. This consists of a slit behind which a film is moved at a regular rate, and the oscillations of the shadow form a series of waves in the picture.

The patient may be at any distance from the heart station, provided the

proper wiring has been done, and Einthoven himself has his laboratory a mile and a half away from the hospital. The only difficulty in transmitting it from almost any distance is the great danger of induction from larger currents in the vicinity. In actual practice this permits leaving the patients in their beds in the wards while the records are being taken some distance away. As the tissues around the heart are conductors, it is only necessary to connect the arms or an arm and leg with electrodes and the currents can be led off from the body to the apparatus. These electrodes consist of large plates of German silver, covered with felt, and saturated with salt solution, and are simply bound on to the extremities. Wires connect to these which lead to the galvanometer.

Every normal individual gives an electrocardiogram which follows a certain type. There are five waves to each heart beat, lettered P, Q, R, S, T, two below and three above the base line. These have all been determined experimentally to represent a contraction of certain portions of the heart. Any change in the height, width or time of any one of them shows that there is some defect in the contraction of that part of the heart and thus we can determine the seat of disease.

This subject is as yet almost in its infancy and there is a great deal yet to be done before it can be placed upon the plane of the absolute. As it appears at present, it promises to be one of the most valuable aids to diagnosis in heart work, that is in possession of the medical profession.

## SAWING A HOUSE IN TWO TO MOVE IT

Few feats of house moving have presented the difficulties that met the contractor charged with the transfer of a three-story frame dwelling from College and Francesca Aves., Somerville, Mass., to a site more than a mile away.

The method employed was equal to

the emergency, however, and to get the building off of its 10-ft. elevation above the street and move it, it became necessary for the movers to saw it completely in two. Each section was then braced and moved by the "roller process" to its destination, and the two sections again brought firmly together



**Moving a House by Cutting It in Halves and Taking It to New Location in Two Loads**

and fastened. The sections were almost 40 ft. in height and measured 20 by 35 ft. at the base. Thus it may be easily seen that it was no small job to move such a topheavy piece of house. It was feared that the slightest puff of wind might turn over the sections while in transit, but by loading the lower floor with bricks the sections were made quite stable.

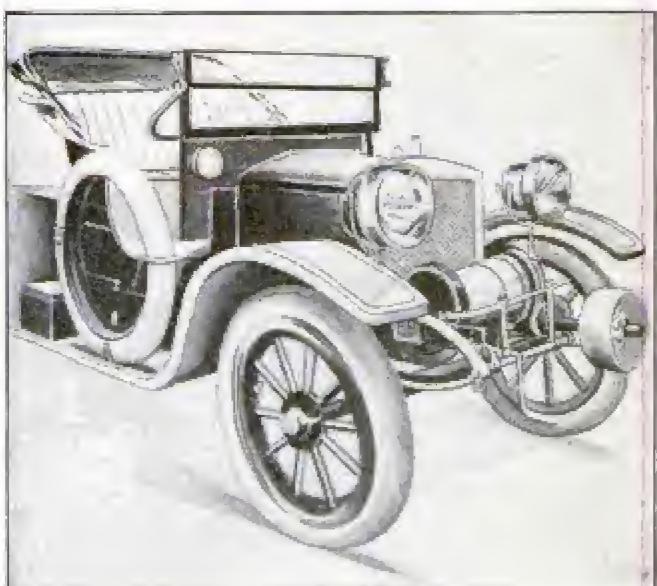
After joining the two sections together the mark of division was invisible to the casual observer, and only on close examination was it possible to see the saw cut.

#### AUTOMOBILES ESPECIALLY FOR ROADLESS COUNTRY

The owner of some thousands of square miles of land in Australia, nearly all of which is devoid of anything in the nature of roads, has been shipped ten specially constructed automobiles. He required a machine capable of a fair speed, provided with gears for stationary work, a winch for hoisting or

pulling it out of soft ground, and with sufficient clearance to negotiate several feet of water.

Although the specifications were difficult and many parts had to be specially made, the result is a car that in general appearance looks quite a smart touring vehicle of the ordinary



**Type of Specially Equipped Automobiles Which Have Been Constructed for Use over Roadless Australian Country**

kind. It is high-set, giving 15 in. absolute clearance, and carries a winding drum and gear forward of the radiator for stationary work.

The engine develops 24 hp., and has an overhead drive to a magneto situated in a casing on the driver's side of the dash. The carburetor is placed even higher, so that 3 ft. of water cannot interfere with it. The shaft for station-

ary work projects forward beyond the frame, so that a pulley can be clamped on as shown in the illustration. This shaft also carries a worm, which engages a worm wheel, to which the transverse winding drum is attached. The drum carries 100 yd. of  $\frac{3}{8}$ -in. wire rope, made specially to insure sufficient flexibility for winding on such a small drum.



Machine That Plugs the Knot Holes



Removal of Knots Gives Packing-Case Boards Greater Strength

## MACHINE PLUGS THE KNOT HOLES OF BOX BOARDS

Boxes containing knot holes are not salable, and in some localities the lumber used for the box shooks is full of such blemishes, with the result that 20 per cent of the total board footage has to be discarded. Much attention, however, is now being directed in all industries toward the utilization of material until recently considered as worthless, and one of the developments of this activity in the box-making industry is a machine that plugs knot holes.

This machine, invented by a Californian, saws out the knot or the section containing the knot hole, produc-

ing holes of uniform size. The same machine also saws the plugs for the holes, the work being done by two small band saws. The plugs are cut from waste blocks of a thickness that corresponds with that of the boards to be plugged. The plugs, being cut slightly larger than the holes made for them, fit snugly, and are held firmly in place by small crimper nails, which leave both the inner and outer surfaces perfectly flush and smooth.

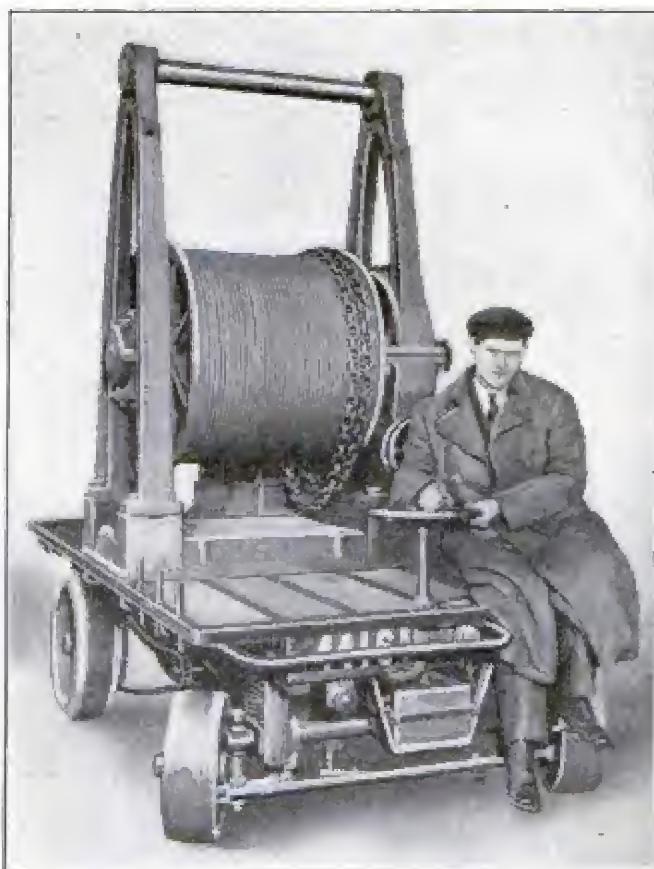
It is estimated that one man operating this machine three or four hours a day can save at least 1,000 ft. of lumber that would otherwise be wasted.

## VACUUM CLEANER WITH A UTILITY MOTOR

A recent novelty in vacuum cleaners is a machine of this class having a motor that can be used for a variety of purposes. By making minor adjustments, the motor can be adapted to run a sewing machine, a polisher for brass or silver ware, a grinder for cutlery, and so forth. The vacuum cleaner itself can also be used for drying the hair after a shampoo or for currying horses.

## AN ELECTRIC SHOP TRUCK

This diminutive truck is one of four being successfully used by a well known manufacturing concern to carry machinery, etc., in and about the factory, on to elevators, and the like. It is similar to the larger commercial electric trucks now so common on city streets. The operator sits on the front edge of the truck and operates the steering wheel and electric control mechanism just like a regular chauffeur.



Electric Truck for Shop Service



Courtesy Illus. London News

Bell of an Ill-Fated Treasure Ship is Rung at Lloyd's When a Ship is Reported Missing

## RINGING THE "BAD NEWS" BELL AT LLOYD'S

The bell of the British frigate "Lutine," which sank off the Dutch coast in 1799, with a cargo of coin and specie valued at \$6,000,000, is the "bad news" bell at Lloyd's. Whenever news is received that a ship is overdue, or when definite news comes of the loss of a ship, the bell is rung by the "caller." At its tolling, all transactions are suspended until the news it heralds is read.

Many attempts, some partially successful, have been made to recover the golden cargo of the "Lutine." About \$500,000 of the sum has been found, the bulk of it in 1800. It was in one of these attempts that the bell was found. Only a short time ago the wreck was again located, and search for the treasure is now being made.

CA national aviation school, under the patronage of the federal government of the country, has been opened at Lima, Peru.



Tilting Frame Motor Truck Ready to Receive a Load



Truck Loaded and Ready to Start on a Trip.

## TILTING PLATFORM MOTOR TRUCK

A French motor truck equipped with a capstan, tilting platform, and a load-carrying truck operating on the platform, is shown in the accompanying illustrations. This type of truck is being utilized in France for military service as well as in industrial work where heavy weights are handled, and saves much hand labor.

The tilting platform, which is about 13 ft. long, is tilted over the rear axle and the loading truck run out on the ground. When the articles to be transported are placed on the truck, the latter is drawn back upon the tilting

frame by means of a capstan, and the frame is tilted back and locked in place, thus completing the operation.

One of the state supreme courts has recently decided that the operator of an unlicensed or unregistered motor vehicle cannot recover damages for injuries received in collision with a railroad train even on a wholly unprotected crossing, on the ground that the operation of an unregistered automobile is unlawful and that the law will not exert its powers to protect one who is himself a violator of the law.

## ORIENTAL RUG TRULY A GIANT CARPET

How many housekeepers would care to shoulder the responsibility of cleaning and safeguarding an Oriental rug of the finest texture that is 67 ft. 5 in. long and 38 ft. wide? This burden has been placed upon the shoulders of the steward of the Pacific Union Club at San Francisco by the receipt in this country of a magnificent rug, one of the largest in the world, which was especially made for the club lounging room in a famous rug establishment just outside of Vienna, Austria.

The design of the rug is a reproduction of the ceiling of the lounging room except that a number of cupids that gambol about the ceiling were not given place in the floor covering. It is made entirely of hand tied knots,

as the trade phrase goes, which means that it was made by hand, there being some 9,518,800 knots of the very best sheep's wool used in the weaving. The work was done by 14 of the most skillful women weavers and they spent 70 working days on the rug. So big was the rug to be that a loom was built especially for it. The shearing and finishing required a full week and 24 men were necessary to handle the rug in these operations, as it weighed exactly a ton. The rolling for shipment was done out of doors, there being no room at the factory large enough. The roll was double-burlaped and packed in a case 3 ft. high, 3 ft. wide and 40 ft. long, in a bed of straw. So long was the case that in shipping to Hamburg



Oriental Rug Especially Made for a San Francisco Club

where it was placed aboard a steamer, two flat cars were necessary. The case was too large to be placed in the hold of one of the big Atlantic liners selected to carry it and it was necessary to wait for one of the largest ships of the line before it could be shipped. In New

York 14 men were required to unroll and roll the rug for customs inspection and it was necessary to use a special truck, such as is employed in hauling steel girders, to carry it across the city to the dock of the steamship line which is to carry it to San Francisco.



Big Loom at Which 14 Women Worked 70 Days Weaving the Rug



#### ARMOR PLATE FOR TURRETS

Among the finishing touches in the construction of a great battleship is the work upon the turrets. The illustration shows activity upon a heavy piece of armor for one of the turrets of the U. S. S. "Florida."

#### IMPROVED SHIP-COALING MACHINE



New Type of Ship-Coaling Tower Constructed at Southampton, Eng.

A ship-coaling apparatus having a capacity of from 100 to 150 tons per hour without dust has been constructed at Southampton, Eng. It consists of an 80-ft. tower mounted on two pontoons, 28 ft. apart. The pontoons are 80 ft. long and support a frame 12 ft. high, on which the tower rests.

When the apparatus is brought alongside the vessel to be coaled, a barge laden with coal is towed into place between the pontoons, and the coal is picked up by an endless chain of buckets, raised to the inclosed hopper at the top of the tower, and discharged through the chutes directly into the bunkers.

Gustav Lilienthal, son of Germany's pioneer in aviation, has organized a society in Germany which seeks to realize man flight without the aid of a motor, and to this end is promoting the study of the flight of birds.

## COPYING THE KAISER

The upturned mustache of the Kaiser, which sets the style for most of the mustaches of Germany, is not easy to acquire in the first place and is always difficult to maintain in spick and span uprightness. A forcible means of shaping the ends is required, and such means is usually found in the form of a shield which fits over the upper lip and cheeks and is fastened around the head. The ends of the mustache are turned straight up against the cheeks and moulded in this form by means of the shield.

The device is usually worn on retiring at night, but that it may also be worn in the daytime is shown by the



How German Sports Keep Their Mustaches Like the Kaiser's

photograph. The wearer is asleep on the sand, presumably after a dip in the sea, which probably destroyed the uprightness of the mustache ends.

## X-RAY WORKS OVERTIME ON PUGILIST'S SKULL

This is an X-ray portrait—profile—of Jack Johnson, the enthusiastic colored motorist who became the world's champion heavyweight pugilist a year or so ago. The average mortal's cranium is a rather dainty affair, rather less than a quarter of an inch in thickness; but a solid half inch of good, honest bone shields Johnson's brain from the unkind world. The common



A Five-Minute Exposure Was Necessary to Obtain an X-Ray Picture of Jack Johnson's Head--From 10 to 15 Seconds Suffices for Ordinary Mortals

or garden variety of X-rays can penetrate the average mortal's skull in 10 or 15 seconds; but the same rays had about five minutes of hard work doing the same thing for Mr. Johnson's.

## CALCULATING MACHINE MADE IN 1642

This calculating machine, the first of its kind, was invented and constructed by Blaise Pascal, a Frenchman, in 1642, in which year he was but 19 years of age. It was made by him with the aid of one workman, and was presented to the chancellor of France. During the revolution it was found in a junk shop at Bordeaux, and at present is the property of M. Bougouin of that city. All of the four simple mathematical operations can be made with it.



Calculating Machine Invented in 1642



# Explosions and Explosives

By HUDSON MAXIM

THE destruction of the powder factory at Pleasant Prairie, Wis., on March 9 last, and the previous explosion of dynamite near Jersey City, have given rise to no little concern in the public mind regarding the manufacture and handling of high explosives. As is usual in such cases, the facts have been largely distorted in current accounts of these disasters, although, in the Wisconsin explosion, only one man was killed and serious damage to property was entirely local, notwithstanding that between 500 and 1,000 tons of black blasting powder were consumed in several distinct explosions, and the earth and air shocks distinctly felt 100 miles away.

In order to present to the readers of Popular Mechanics Magazine an expert account of the nature of such explosions, Mr. Hudson Maxim, the greatest living authority on this subject, was requested to explain the apparent vagaries of accidental and violent explosions. — THE EDITOR.

WHENEVER an explosion occurs in an inhabited portion of country, whether it be of 100 lb. or 500 tons, of black gunpowder or dynamite, the air wave and the earth wave set up by the blast always produce within the radius traversed by them a highly exaggerated impression in the minds of the inhabitants concerning the actual destructive force of these waves, with the result that the damage done, if any, within the radius of the effects of the blast is correspondingly overestimated.

This was especially exemplified on the occasion of the recent explosion of 10,000 lb. of dynamite at Communipaw, N. J. The fact that considerable window glass was broken throughout Jersey City, Hoboken and the Borough of Manhattan, and that the shock was felt all over Greater New York and its immediate suburbs, gave the impression that a vast amount of damage had been done.

As one result of the mental perturbations, a bill was actually introduced at Albany, N. Y., to limit the amount of explosive in transit through the larger cities and towns to 28 lb., and the amount that might be stored in any one place to 1,000 lb. If such a

bill should become a law, and the law enforced, the cost of constructive work involving the use of explosives in Greater New York alone would be so increased as, in many cases, to be quite prohibitive, and in most cases impracticable. It is a moderate statement that the effects of such a burdensome law would cost the city every day more than the entire damage done by the explosion.

A wider public knowledge, therefore, is much needed concerning the nature and effects of explosions, and the limitations and extent of actual serious damage they are capable of producing.

The fact that the atmospheric disturbance and the earth tremor produced by the explosion of a few tons of dynamite may be felt at a distance of 50 miles is not remarkable; but that any serious damage should be done at a distance of 8 miles by the explosion of even 100 tons of explosive would be remarkable. There is a vast difference between an apparently serious and destructive disturbance of earth and atmosphere produced by an explosion, and a really destructive disturbance.

On a quiet evening certain small



This Hole, All that Marks the Spot where One of the Powder Magazines Stood at Pleasant Prairie, Wis., is about 150 Feet Long, and 50 Feet Deep at One End. Great Lumps of Hard Clay Cling to the Sides of the Hole



Exact Spot where the Pleasant Prairie Explosion Started: All that Remained of the Glazing Mill, where 1,000 Pounds of Powder was Ignited by Some Agency, Probably Friction

insects may be heard at a distance of half a mile. When we take into consideration that a grasshopper-like insect, the katydid, may, by rubbing his thighs against his wings, set in audible agitation half a cubic mile of air, weighing many thousands of tons, it is not surprising that the voice of a ton of exploding dynamite should be heard and felt at a distance of a few miles. Obviously, the amount of energy actually developed by a katydid is exceedingly small, and still it is able to shake half a cubic mile of air weighing thousands of tons, which, in turn, makes all the forest trees and houses tremble, and even the earth to vibrate under the agitated air, although the agitation of the trees, houses and earth is not sufficiently powerful to be perceptible to us.

In 1883, in the Straits of Sunda, the whole top of an old extinct volcano, known as Krakatoa, was blown into the sky by the most stupendous blast within historic time. This explosion actually shook the whole earth sufficiently to affect a seismograph on the opposite side of the globe. A tidal wave was set up that encircled the earth; and an atmospheric wave, so great that it actually encircled the earth three times, was set in motion. But the actual destructive effects of the volcano were limited to the immediate volcanic zone where the explosion occurred.

Evidently then, the actual distances at which an explosion may be felt and its effects made visible are no indication that the effects are actually destructive to any such distance.

Let us examine into what really happens when a mass of explosive, such as dynamite, is set off upon the earth's surface. At the instant of detonation, the explosive body is converted into a ball of incandescent gases under an initial pressure or tension of, perhaps, 300,000 to 500,000 lb. to the square inch. This ball of hot gases under the enormous pressure expands rapidly in all directions. Its expansion downward is arrested by the earth, which offers far greater re-

sistance than does the atmosphere, with the result that the blast forms a crater in the earth under it, while the mass of expanding gases rebounds upward from the crater into the air in the form of an inverted cone, carrying the air before it. The amount of explosive energy directed upward, displacing the atmosphere, is as much greater than the energy directed downward, as the resistance of the atmosphere is less than the resistance of the earth.

Therefore, when a large mass of explosive, like that at Pleasant Prairie, explodes, the expanding gases lift an enormous quantity of air in their upward rush, greatly compressing it, with the result that this great lifted body of air moves outward in all directions upon the surrounding air, both by virtue of its gravity and by its powers of expansion. Therefore, a great wave of compression is sent upward and outward in all directions.

The stratum of air composing the wave of compression actually moves through but a small distance. It merely transmits its energy to a succeeding stratum of air outside of it, and then returns to its original position, and so on. In other words, the wave of compression is one of atmospheric vibration. Actually, it is a large sound wave, and travels at the speed of sound, namely, about 1,100 ft. per second. The earth wave travels more rapidly than the atmospheric wave, because the vibrations are transmitted through earth more rapidly than through air. Thus it is that two shocks follow each other in quick succession after an explosion—the first is the earth shock and the second is the air shock.

The amplitude or length of the vibration which travels through the earth is much less, that is to say, the wave length of the earth vibration is much less than the atmospheric vibration. While a distinct jar of the earth may be felt at a long distance, little destructive effects are ever produced by the earth vibration, even at comparatively short distances.



One of the Vagaries of the Pleasant Prairie Explosion—A Person Standing where the Man is Shown Would Probably Have Escaped Injury, as the Tree Near Him Was Not Damaged, Yet Trees Not More than 150 Feet to the Right Were Shattered

It is the atmospheric vibration or atmospheric wave that breaks the window glass. The reason why much glass is frequently broken, even at great distances from an explosion, is interesting, as is also the reason why the broken glass falls outward into the street.

Let us, for example, take a ball of dynamite a foot in diameter, and suspend it high in the air, so that when exploded, the gases may expand freely in all directions, and let us assume that, at the instant of detonation, the pressure be 400,000 lb. to the square inch. When the ball has expanded to twice its original diameter, it will occupy 8 times the space, and when it has again doubled its diameter, it will occupy a space 64 times as great as it originally did, and so on, so that by the time it has expanded to 100 ft. in diameter, or 50 ft. radius, it will occupy a space one million times as great and will exert only one-millionth of the pressure which it originally did—that is to say, two-fifths of a pound.

But the work done in displacing the surrounding atmosphere would consume a good deal of energy, with corresponding reduction of heat and expansive power, so that by the time a

foot of dynamite had expanded in all directions to a distance of 50 ft., its expansive power, at least, would become zero, followed by a reaction of the surrounding atmosphere to fill the void formed by the cooling gases.

There are two ways in which the atmosphere yields to the force of an exploding body. The air in the immediate vicinity of the explosion is driven forward like a projectile, and with a velocity which may be at a rate of several thousand feet per second, until the expansive force of the gases is expended. The distance through which this occurs is very short.

When the expansive power of the gases is exhausted, the great wave of compression which is produced, is, in effect, a great sound wave and obeys the same laws that govern sound. It travels at the same speed as sound as it moves outward in all directions. It thins out just as a soap bubble thins out when it is blown bigger. Also its degree of compression decreases as the square of the distance, so that when it has traveled to a distance of two miles, it exerts only one-quarter of the pressure that it exerted when it had traveled to a distance of one

mile, and the duration of the pressure will be only one-quarter as long, etc.

As the wave of atmospheric compression is in the form of a hollow sphere, it would take 8 times the quantity of explosive to produce a given effect at 2 miles that it would take to produce the same effect at a distance of one mile. Actually, then, in order to produce a very destructive effect at any great distance, an enormous quantity of explosive is required.

The effects of explosions of all magnitudes upon buildings and other structures at all distances where effects are perceptible, have been carefully tabulated, and curves of their average effects drawn, and it has been shown beyond question that at distances of a few miles, the effects are not at all in proportion to the quantity of explosive consumed. At a distance of 10 miles, it would not matter much whether 200 tons or 2,000 tons of dynamite exploded, the damage would still be confined mostly to broken glass, and other frail and non-massive objects and structures.

How then is so much glass broken? Two things are necessary to produce destructive effects upon massive structures—time and pressure. As much as 500 lb. of dynamite may be hung upon the face of 12-in. armor plate and exploded, without injury to

the plate, because the time is too short. Although the pressure for an instant is enormous, still its duration is not long enough to cause the strong and massive plate to yield. In consequence, the gases rebound from the plate, themselves becoming a projectile. Thus it is, that the duration of the atmospheric wave is not long enough materially to affect the massive walls of buildings beyond the immediate zone of the explosion, where the air is driven as a projectile.

The fact, however, is otherwise with window glass, owing to its lack of mass. Let us suppose that the atmospheric wave exerts a pressure of one-tenth of an ounce to the square inch. This would be about 1 lb. pressure per square foot, and on a pane of glass 10 ft. square, it would represent a total pressure of 100 lb., which would be sufficient to spring the glass inward. But the wave of compression is relieved so quickly that before the glass has time to break under the pressure, the external pressure has gone, and is succeeded by a corresponding node of minus pressure, so that we then have the energy stored in the glass and a minus pressure outside. Consequently, the two acting together force the glass outward with such force as to break it. This is why window glass blown out by an explosion falls into the street.

## MODERN LOADING DEVICE WORKS FOR CHARITY



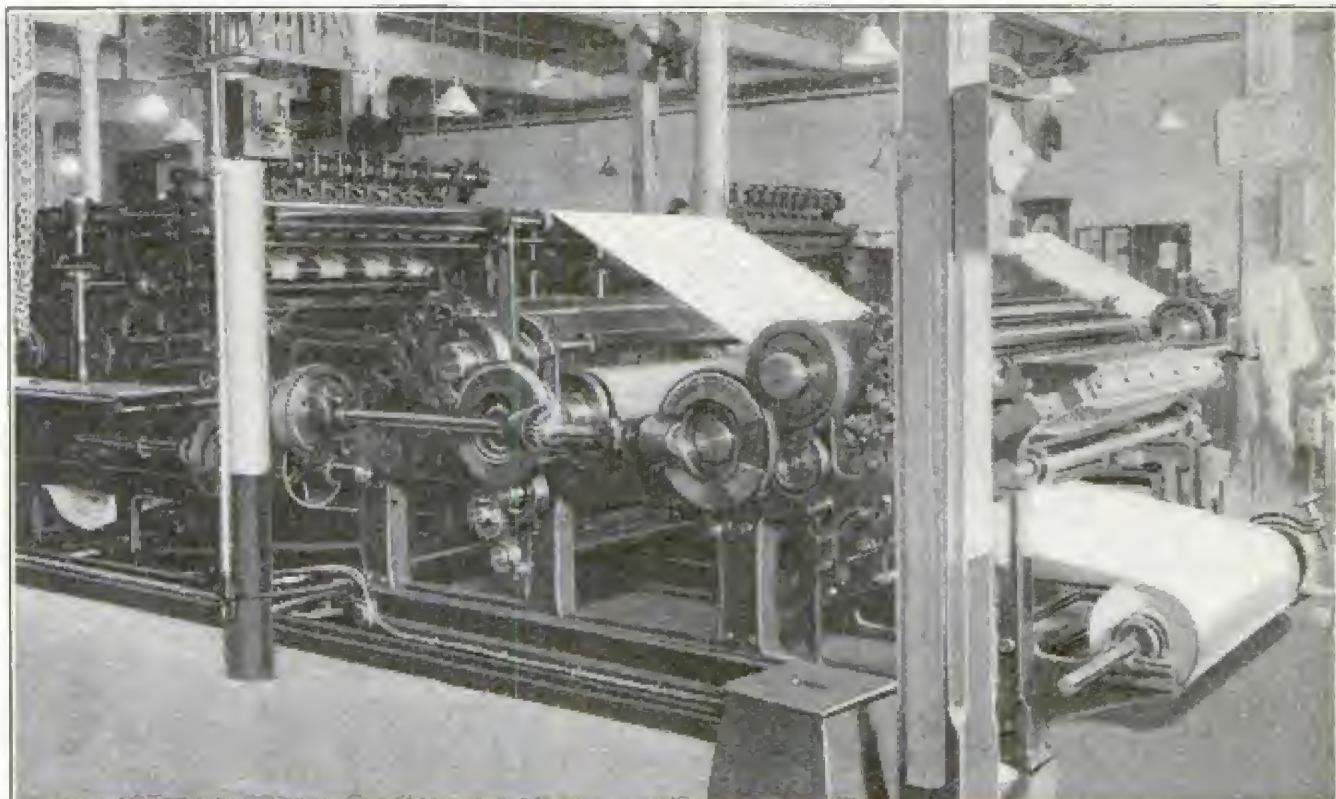
Photograph by Underwood & Underwood

**Flour for Relief of Starving Chinese Being Loaded on Board the Army Transport "Buford" by the Most Improved Loading Machinery**

Much of the success of the quick dispatch of the U. S. Army Transport "Buford" to China with a hold full of flour for the relief of the starving in the plague and famine stricken districts, was due to the use of modern machinery for loading the vessel at the Seattle docks. The "Buford" carried thousands of sacks of flour purchased with the proceeds of a popular subscription collected by The Christian Herald. In Seattle, where the vessel was loaded, the entire community aided in the work. A ball was

given for the benefit of the fund and society girls sold tickets for this affair on the streets. The longshoremen who work on the docks volunteered their services free and the United States government provided the vessel, without cost.

Under the old conditions, all post cards were printed on flatbed presses and afterward the sheets were cut up into individual cards on a separate machine. With the new cylinder presses, the cards are printed at the rate of 96 to each revolution of the press and



New Government Press Which Turns Out Postal Cards by the Million

### PRINT FOUR MILLION POST CARDS A DAY

The latest and certainly one of the most interesting additions to Uncle Sam's category of automatic marvels is found in two monster presses costing \$36,000, recently installed at the Government Printing Office at Washington, for printing postal cards. These presses were designed and constructed for this work, and rank as the fastest presses of the kind in the world. Each is capable of turning out 2,200,000 complete post cards in an 8-hour working day, and under ordinary operating conditions they average 1,800,000 cards per day,—the two presses now turning out between 3,500,000 and 4,000,000 cards per day,—six days per week, this output being required to keep pace with the correspondence of the American people.

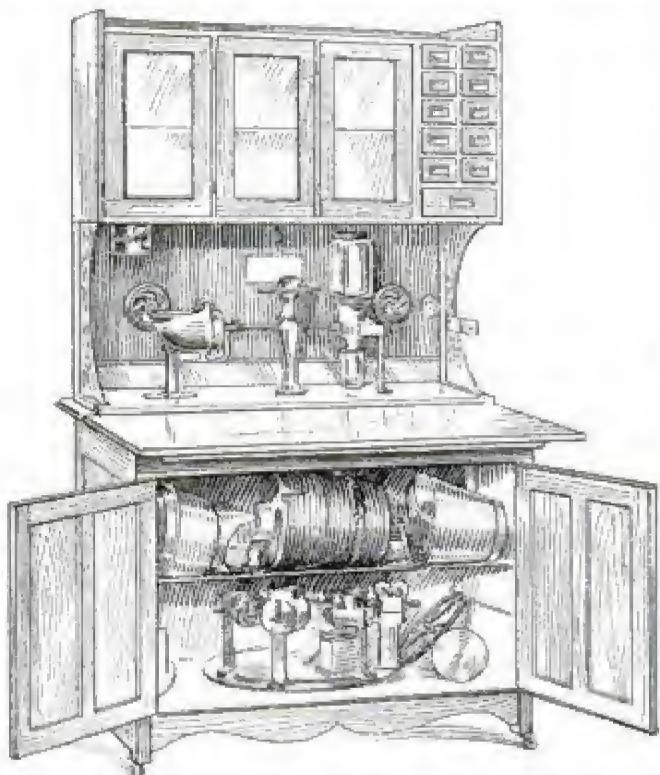
the cutting, trimming, and counting of the cards is included in the work performed, thus reducing the labor cost about 50 per cent. Within six months the government expects to have in operation a supplementary machine which will apportion the post cards in packages, a work which now requires the services of a dozen young women.

The special paper for the cards is fed to the presses in the form of rolls each weighing 1,200 lb. and containing material for 225,000 cards. Post cards turned out by the new presses are put up in packages containing 10,000 cards each. A surplus stock of 70,000,000 post cards is kept on hand at all times in a reserve vault.

**A** national school of telegraphy has been established in Panama, the capital of the Central American republic of the same name.

## AN ELECTRIC KITCHENMAID

With the exception of scrubbing the floor, this electric cabinet is designed to do practically every kitchen chore requiring that commodity commonly known as "elbow grease." It is simply



**Kitchen Cabinet Provided with 11 Electrically Operated Culinary Devices**

a case of "turn on the current and the motor does the rest."

In a special compartment, out of harm's way and protected from dust and damp, is a little electric motor somewhat more powerful than an average man and so economical that if it were run two hours a day, the cost for electric current would be only about 13 cents a week, at the average city rate for electric power.

On the table top of the cabinet there projects a standard on either side of which is a revolving power arm. At the end of each arm there is a simple clutch that gears with the spindle of the kitchen utensils. These devices are fitted with a standard base for sliding in a grooved channel under either power arm and can be connected up or detached while the motor is running. In the illustration there is shown a vegetable slicer connected to the power arm on the left, and a coffee grinder

on the right. Besides these, there are, compactly arranged in the base of the cabinet, a bread mixer, cake mixer, egg beater, meat chopper, potato and lemon grater, cherry pitter, knife sharpener, knife polisher, and ice-cream freezer. A special extension shaft can be fitted to operate a pulley at the right side of the cabinet for running the ice-cream freezer or any household device, such as a dish washer, clothes washer or sewing machine. The upper part of the cabinet contains a flour bin and sifter, besides compartments for spices, tea, coffee, sugar, and the like.

## HASTE TO FLY FOR MONEY MAY BALK PROGRESS

In the early days of the automobile, the noisy, unreliable engine of only 4 hp. was sufficient, and people enjoyed automobiling then, many thinking the desired had been accomplished and that the clumsy little rattle-traps were a great invention, says a writer in *Aeronautics*. The design of those early automobiles was very blind to good engineering. Most of them were poor jobs of carriage building, with a very crude motor attached. The condition of the carriage building trade at that time was very little behind what it is today and there was no excuse for such atrocious body designs as were perpetrated in the name of the automobile. How different the present 30 to 60-hp. car, with its refinements and conveniences and excess power enough to negotiate any hill or road with ease? This refinement has not come from learning how to build better carriages or do better upholstery, but from the increased life and service of the motor—the improvement that has changed the auto from an occasional plaything to a daily necessity.

Aeroplane building is following in the wake of the automobile, and already is more attractive as a sport. Unless the public is more discerning in its demands, the progress in the development of the aeroplane will be as slow as with the automobile. To be sure, the automobile grew at a tremendous

rate, but the aeroplane should profit by the lessons taught. There is no good reason for building aeroplanes with wood work on them that would make any conscientious carpenter blush with shame, with metal work that any good ornamental iron worker could improve by 50 per cent, and with covering of which no upholsterer or sail maker would be guilty. The haste to get to flying and win the large prizes offered for various flights has been provocative of these things, and as a result, most of the prizes have been premiums on daring, rather than substantial recognitions of scientific or engineering ability applied to aeroplanes.

The money prize as a premium on daring is a detriment to the growth of a substantial industry. The public wants aeroplanes built with the same engineering intelligence that is applied to roads, ships, bridges and present-day automobiles. The sooner the crude little aeroplanes, built by adventurers, are replaced by the production of skilful and thorough designers, the better chance this country will have to lead the world in aeronautics. It should be possible for us to profit by the experience of the past and avoid great waste of money and effort on worthless productions.

#### TWO EARS OF CORN ON ONE STEM

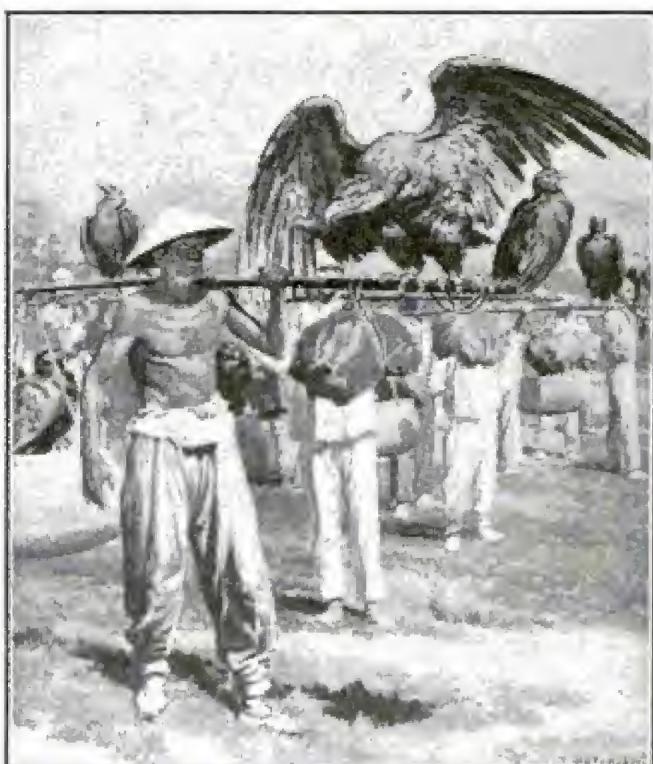


and each having 14 rows of grain.

In the last crop of corn grown on the Crunk & Thomas farm, near New Haven, Ill., was found a genuine "nature freak" in the form of two ears of corn growing on one stem. The ears are the same size, both being  $8\frac{1}{2}$  in. long,

#### TAME EAGLES AS DECOYS FOR WILD EAGLES

Thousands of Chinese hunters trap wild eagles in Mongolia every year by the employment of tame eagles as



Courtesy The Sphere, London

**Chinese Trapper, Armed with Tame Eagles, Starting Out on an Eagle Hunt**

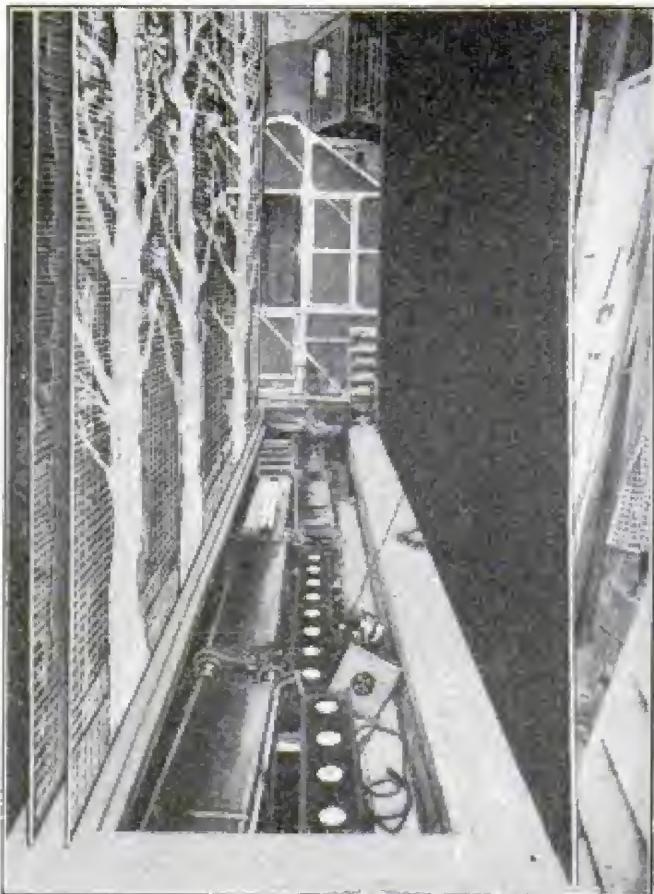
decoys. They carry the tame eagles on their shoulders in the manner shown by the illustration, and when a likely locality is reached, they arrange nets within which are placed large quantities of bait, usually small fish. Operating lines are stretched to a distance of about 500 yd. from the nets and, when the wild birds have joined the tame ones at the feast, these nets are brought into action.

The value of the capture depends upon the condition of the feathers, which are used for fans. Only the largest feathers are of use, and a fan of black feathers, white near the middle, brings as high as \$25.

Probably the only person exempted specifically by law from paying tariffs is the president of the republic of Panama, who, by a recent law, may import any article duty free for his own personal use.



Soft, Mellow Background Secured in "Chantecler"  
Staging by Novel Scenic Arrangement



Copyright by Charles Frohman  
Gauze Screens, Lighting Trap, and Black Velvet  
Curtain at Rear of Stage

## THE NEWER STAGE SCENERY

Hurrying the boy to the station with a tightly-rolled mountain-range in one hand, a neatly wrapped forest in the other and the village green snugly tucked under one arm will lack novelty to the actor of next year. Stagecraft has taken a huge forward stride in the novel scenery used in the New York production of "Chantecler."

The innovation, which eliminates cumbersome wooden stage settings altogether, is the product of the artistic genius of Mr. John W. Alexander, president of the National Academy, although in its practical development, Miss Maude Adams has had no small share. Briefly, plain blue gauze of varying shades and thickness forms the basis of the new scenery, the variations making for different effects of light and distance. The sky is painted on in solid blue color; the scene, trees, etc., are laid on in hardly more than outline, so that they are very nearly transparent. An invisible framework of light chain around the edges holds

the gauze solidly in position during the play; and when the time comes to clear the stage, it is necessary only to release the tension, drop the whole to the stage and roll it up.

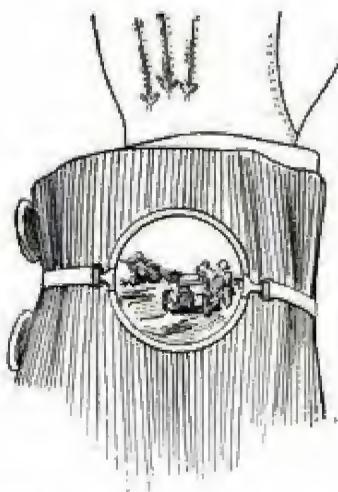
A little distance to the rear, a solid black velvet curtain is hung across the entire stage, and between gauze and curtain lies the lighting trap, sunk below the level of the flooring. The whole trick, of course, lies in the skilful manipulation of the lights which, thrown upon the gauze, cause the objects to melt softly into the black background, while the sky remains blue.

On the artistic side, the gauze scenery does away completely with the harshness of the conventional stage setting, which, however faithfully it may reproduce detail, generally fails utterly to give the eye an impression of things as they appear in everyday life. Instead, it keeps its place in the scheme of the picture and furnishes a mellow and harmonious background for the movements of the actors.

From a commercial standpoint, the story seems briefly and fully told in the recent statement of Mr. Charles Frohman, pioneer of the new scenery, to the effect that in transportation it will occupy not more than one-quarter the space of wooden scenery, and that he alone expects to save by its use something like \$100,000 annually in the shipping cost of his productions.

### SLEEVE MIRROR FOR MOTORCYCLISTS

A small convex mirror, fastened to



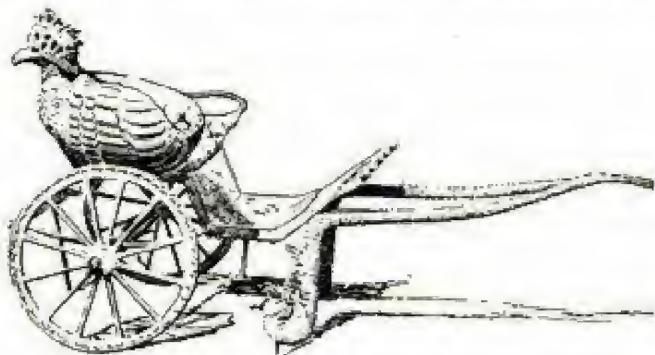
one of the sleeves at the wrist by means of a rubber band, is a handy little device for motorcyclists. By lifting upright the arm to which it is attached, the road behind may be seen

without the necessity of twisting around in the saddle.

### A BIRD CART FOR THE DUTCH PRINCESS

The curious little cart presented to the Queen of Holland for the use of the little Princess Juliana by Prince Pokoe Alam VII., sovereign of one of the

states of the East Indies, is probably the most costly child's cart in the world. The body takes the shape of a



*[The Gift of Prince Pokoe Alam VII. to the Little Princess Juliana of the Netherlands]*

"garoedo," a mystic bird sacred to the Hindu religion, and the entire cart is ornamented with artistic carved work.

### BOTANICAL CURIOSITIES

Tropical plants, of course, must be kept in hot houses during the winter months in cold countries, but in India there are houses for protection of flowers which are just the reverse. Plants from the colder countries, unused to the heat of India, are kept in cold-houses, the curious construction of which is shown in the illustration of one in the botanical garden in Calcutta.

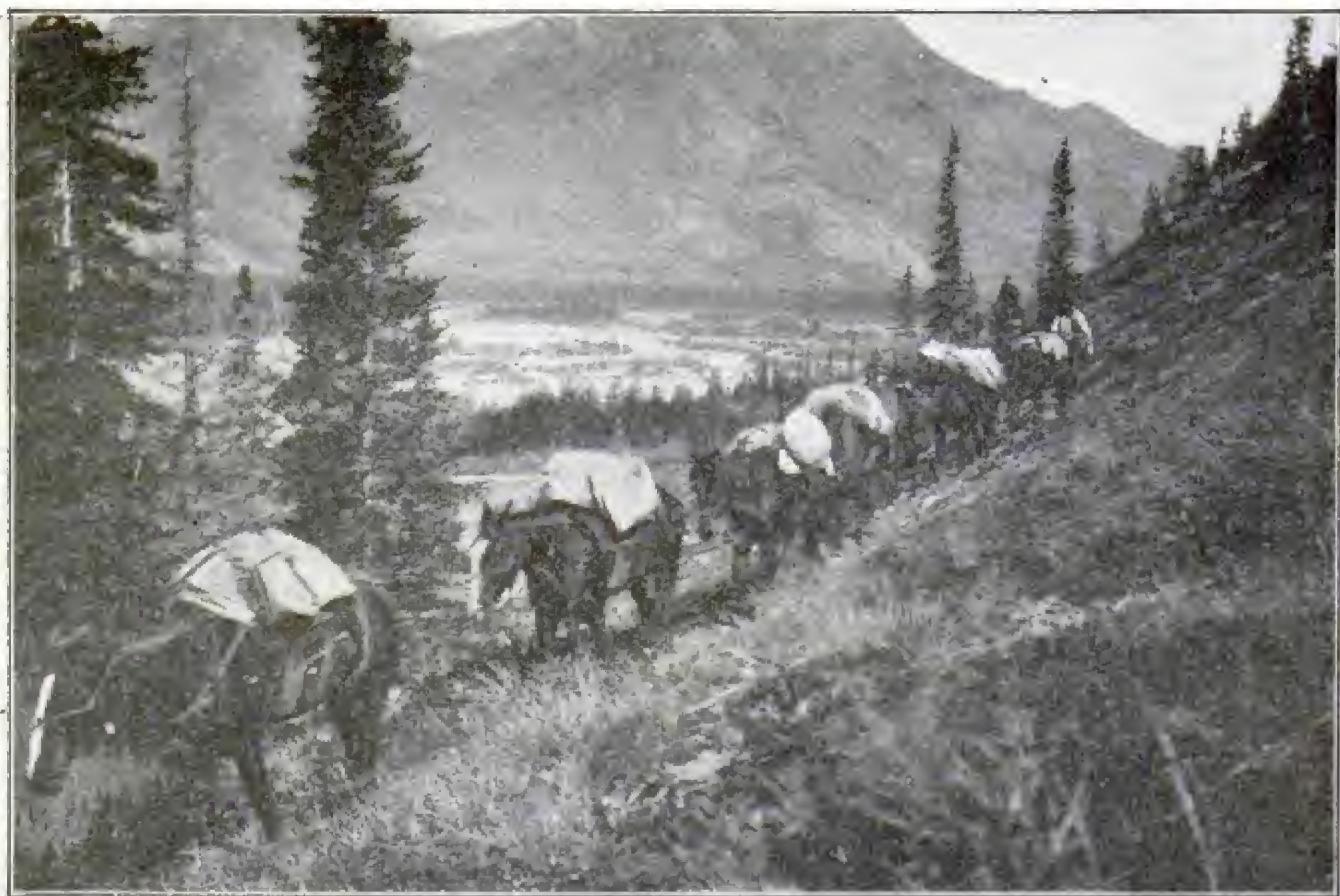
The other illustration is of a lily pond in Zurich, Switzerland, which is heated so that tropical lilies will thrive in it. The heating pipes are on the bottom of the pond. The arrangement is for the summer months only, and the plants have to be transferred to a hot-house in the winter.



Lily Pond in Switzerland Heated so That Tropical Lilies Will Thrive in It



Cold-House of Calcutta Botanical Gardens for Plants Unused to the Heat of India



The Gap in the Backbone of the American Continent, Showing Discoverers' Pack Train

## THROUGH THE ROCKIES ON A PRAIRIE GRADE

Construction crews this spring reached Tête Jaune Pass, the one gap through the continental fence of the Rockies through which a railroad can build on a prairie grade. The Grand Trunk Pacific had reconnoitering parties in the field for three years before the pass was found, for such a gap in the great mountain barriers has been the prize sought by high-priced engineers for years, from Mexico north. Through this hole, which the giants of the mountains failed to stuff up, this third Canadian transcontinental line will reach the Pacific on a grade no greater than that of nearly all western roads over which hogs are hauled to the Chicago market across the prairie states.

The highest mountain summit is 3,712 ft., so that the heaviest grade against trains west-bound will be 26 ft. to the mile. The grade against east-bound trains will be only 21 ft. to the mile. It was considered a great achievement when the Canadian Pa-

cific blasted, dug and tore its way through the Rockies with an extreme elevation of 5,299 ft. at one point and 4,308 at another, which made a grade of 237 ft. to the mile against east-bound traffic.

In the United States, the Santa Fe rails go over the Rockies at an elevation of 7,000 ft., one summit being 6,987 and another 7,132 ft. The Western Pacific negotiated the mountain barriers at 5,712 ft., and the Union Pacific crosses five summits, one of which is 8,247 ft., and another is 7,107.

The task of groping through the wilderness, winter and summer, in the search for this pass, was accomplished without the loss of a man, notwithstanding that all the provisions had to be packed in from the Pacific on one side and from Edmonton on the other, a distance of more than 1,000 miles, on the backs of horses and mules. The commissary department, during this reconnoitering feat, was quite as important as the engineering of it, for

without the assurance of abundant "grub" in the "caches" in the mountains and forests, the achievement never would have been accomplished.

### THE FIRST AERIAL POSTAL SERVICE

The first aerial post established under government postoffice regulations and having its own distinctive postmark was inaugurated at the Exposition of the United Provinces of Allahabad, India. Captain Wyndham, one of the well known English airmen, obtained permission from the British government to establish the postal substation at the exposition grounds, from which he carried letters to the central postoffice at Allahabad, which lies across the Jumna River.



Letters Stamped with the First Aerial Postmark and Carried by First Aerial Post Under Government Regulations

The aeroplane mail service was besieged with "His Majesty's Mails," as many as 6,000 letters being carried on one trip. The postmark with which the letters were stamped consisted of an aeroplane and the inscription "First Aerial Post. Exposition of the United Provinces of Allahabad, 1911."

### TRUCK TO TOW AEROPLANES

As a means of rapid transportation over roads and through the city, the Wright brothers have developed a very interesting truck fitted with pneumatic tires, placed underneath



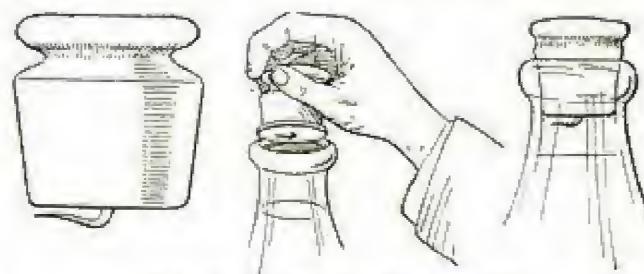
Aeroplane Truck Being Towed through City Streets by Auto

the aeroplane so that one end of the plane can be attached to an automobile and in this way be towed with ease.

To make the plane ready for transportation, it is only necessary to remove the tail and fold the front skids up against the machine, in which way the plane has no greater breadth than that of the ordinary automobile, and can be towed up any street through which an automobile can pass.

### MILK BOTTLE OPENER AND STOPPER

The problem of keeping milk free from dust after the cardboard cap has been removed from the bottle is solved by the use of a unique stopper now being distributed by a Waltham, Mass., firm. In the bottom of the stopper is a hook by means of which the ordinary



Used as an Opener and Stopper

cardboard cap may be removed from the bottle without danger of spilling or squirting the milk or cream in every direction.

## DIGGING IN RIVER BED TO DISPROVE SHAKESPEARE

Dr. Orville Owen, a physician of Detroit, Mich., and one of the best known Baconians in this country, is



Courtesy Illustrated London News

Digging in the River Wye, England, for Proofs That Bacon Wrote Shakespeare

holding public attention by his mining operations in the River Wye, England, through which he hopes to conclusively prove that Francis Bacon wrote not only the works of Shakespeare but also the works of Greene, Marlowe, Spencer, Peele, and Sir Philip Sidney, and was the son of Queen Elizabeth. Proofs of these statements were hidden in the River Wye at Chepstow by Bacon himself, according to Dr. Owen, who believes these proofs will be found to include the original manuscripts of the plays in question.

Dr. Owen bases his beliefs on a cipher which he is said to have discovered in an edition of Sir Philip Sidney's "Arcadia." The cipher is said to contain such sentences as ". . . boxes like eels in the mud, boxes swathed in camlet and covered with tar"; "make a triangle of 123 feet due

north and thirty-three paces;" "I filled up the shallow water with mud and beams;" "I cut down all the trees and turned the course of the river."

## POTATOES RAISE BROOD IN DARK CELLAR

A unique potato development or cultivation, possible in a dark cellar, at any season of the year, has resulted from an accidental discovery by an English farmer, and the experiments he subsequently undertook to satisfy his curiosity. He had left a quantity of potatoes in a dark cellar and forgotten them. Upon remembering the fact some time later, he expected to find them decayed, but instead discovered that each potato was surrounded by perfectly white and sound little potatoes. He took the best of these, had them cooked, and found the flavor fully as good, if not better, than "new" potatoes. They were also much firmer, and the skin so soft and thin that scraping or peeling was unnecessary.

After several experiments he found that large, perfectly sound potatoes, preferably of the last season's crop, made the best brood potatoes. In the cultivation, it is first necessary to prune off the roots, which are likely to sprout. The pruning should be done under feeble artificial light, and care should

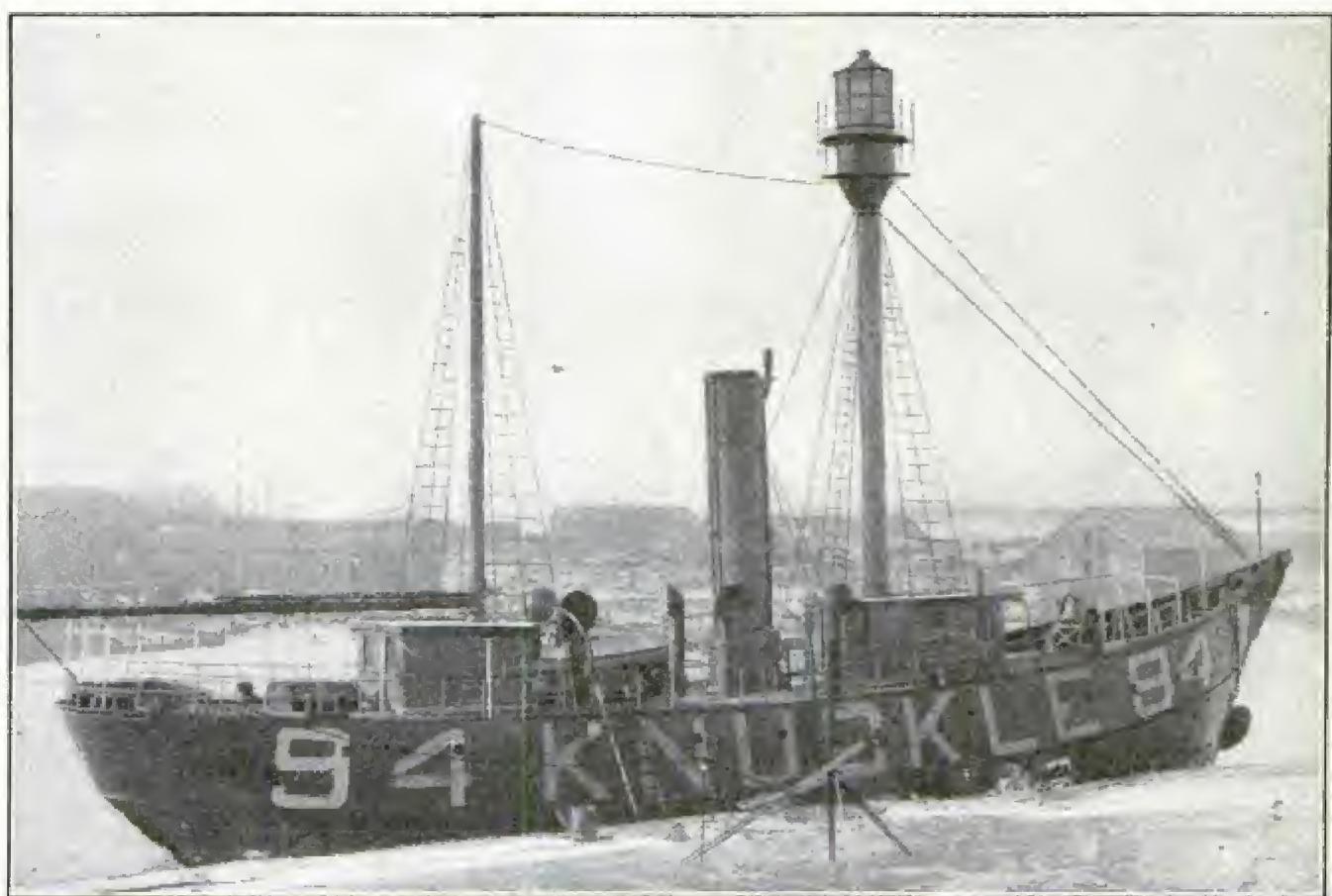


The Old Potatoes and the Broods that Result from Unique Method of Cultivation in a Dark Cellar

be taken to remove any possibly decaying matter from the potato. Then the potatoes are spaced about 4 in. apart on a layer of dry and finely sifted loam, spread to a depth of an inch or two over boards. In a short time they become covered with what might be called "potato buds," and within two or three weeks these develop into edible potatoes. After a similar period, a second crop will be developed, and

even a third, until nothing remains of the old brood potatoes but the skins. It is an interesting fact that the combined weight of the crops from each brood potato will be greater than its own original weight.

The originator of this potato culture says that if the potatoes are put in cold water, boiled for 10 minutes, then fried in butter, the resultant dish is very delicious.



Equipped with a Revolving Light on a Hollow Mast Containing a Ladder, This is the Most Up-to-Date Light Ship in the Country

### A LIGHTHOUSE ON A LIGHT SHIP

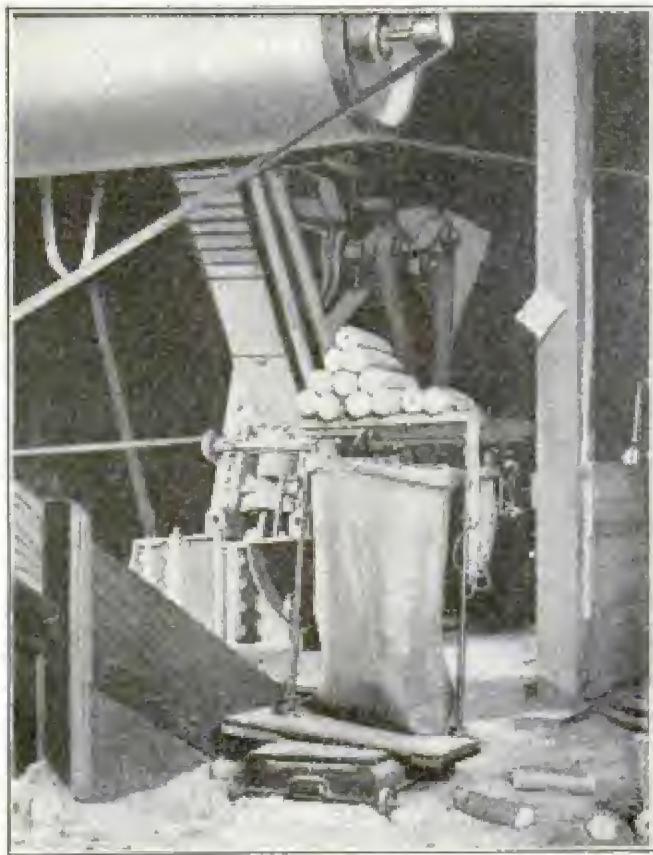
The first of its type built in America, this light ship is just as safe in a storm as in a calm, so long as the vessel keeps afloat, inasmuch as the light is set on top of a hollow spar, 75 ft. high, constituting in effect a lighthouse on a light ship. There is a ladder within this spar, so that the crew may climb up to the revolving light without being exposed to the stress of weather.

The vessel, which is 135 ft. long, 29 ft. beam and 12 ft. 6 in. draft, is sta-

tioned on Frying Pan Shoal, on the coast of North Carolina. Her steaming equipment includes two Scotch marine boilers and a fore-and-aft compound engine, and in addition there is a steam-operated fog signal giving an automatic whistle blast of three seconds' duration twice a minute. There is a wireless station in the after deck house, and the vessel is built so that she may be equipped with auxiliary sails, in case of expediency. Altogether, she is the most up-to-date light ship in the country, and is the prototype of others that are being built on similar lines.

## ELECTRIC COMPRESSOR FOR SAWDUST BRIQUETTES

An invention which the makers believe will eliminate the waste in planing mills, sawmills and other plants



**Electrically Driven Machine that Compresses Five Tons of Sawdust Briquettes per Day**

that produce sawdust and shavings has been devised by a Los Angeles inventor, and the product of the machine is now on the market in the shape of cylinders of pressed sawdust about the size and shape of stove wood. No sticky substance is required to hold the particles together, as the material is compressed with a pressure of 30 tons. The mass of waste matter is said to come out as a clean, dry and convenient fuel, which burns with no soot and very little smoke.

The machine is driven by electric power, and the sawdust, shavings, etc., are automatically fed into steel dies, through which they are forced by the enormous pressure of a pair of plungers. In order to keep the briquettes or cylinders from flaking, a rough hemp cord is fed through the dies along with the sawdust, and forms a core which might be com-

pared to the wick of a candle. As the sawdust cylinder emerges from the machine, it is cut into the desired lengths by a knife operating with a trigger.

The machine shown in the illustrations has a capacity of five tons per day.

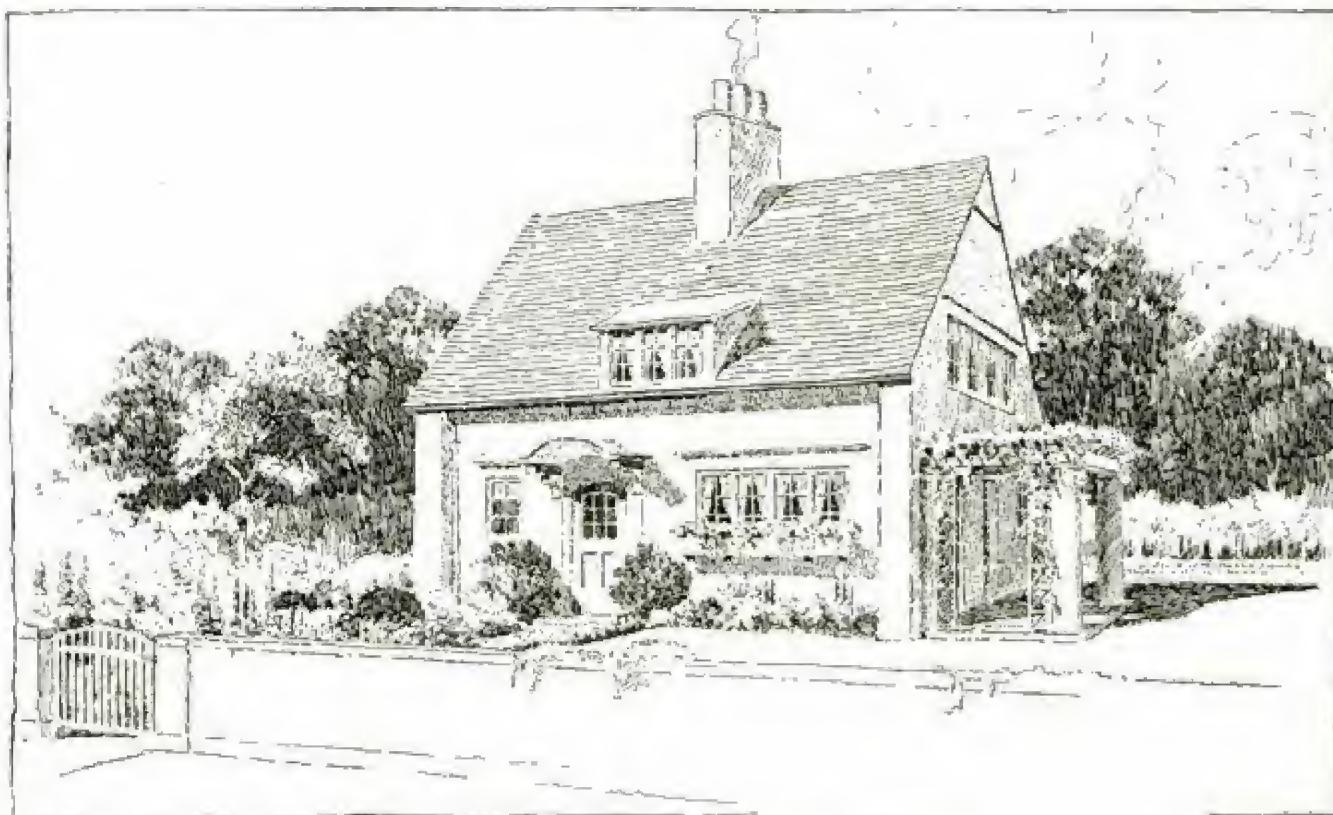
## THE COMPASS NEEDLE AS HEAT INDICATOR

In order to determine the most favorable degree of heat for hardening steel tools, an ordinary compass can be used, according to the French magazine "Cosmos."

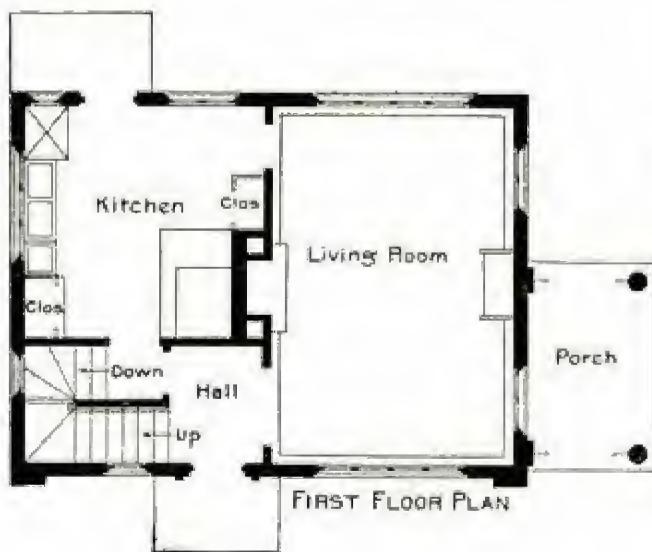
As steel is heated, it gradually loses its magnetic properties and in different proportions for different qualities of steel, so that this phenomenon might easily be utilized to measure the temperature. It has been found that the degree of heat at which all magnetic reaction disappears, coincides exactly with the temperature most suitable for hardening of drills, chisels, planer-irons, etc. The tool is heated in the forge and held at a certain distance from a compass. If the needle deviates, it is again heated until no deviation is observed, when it is immersed in the bath as usual.

## APPARATUS FOR TESTING RAILROAD LAMPS

In order to devise a tungsten lamp that will be rugged enough to withstand the jolting and jarring of a railroad train, a French inventor has made a testing machine to imitate the rough usage of actual railroad travel so that he may readily ascertain in his laboratory the shock-resisting properties of the various improvements he tries out from time to time. The holder in which the test lamp is placed is automatically given a continuous succession of shocks which are registered by a counter. The breaking of a lamp filament causes the electric current which drives the "shocking" device to be cut off automatically, so that no further attendance is required until the test is completed.



Front Elevation, Showing Side Porch or Loggia



Designed by Mink &amp; Carson, Architects

## SMALL HOUSE WITH TWO ALCOVE BEDROOMS

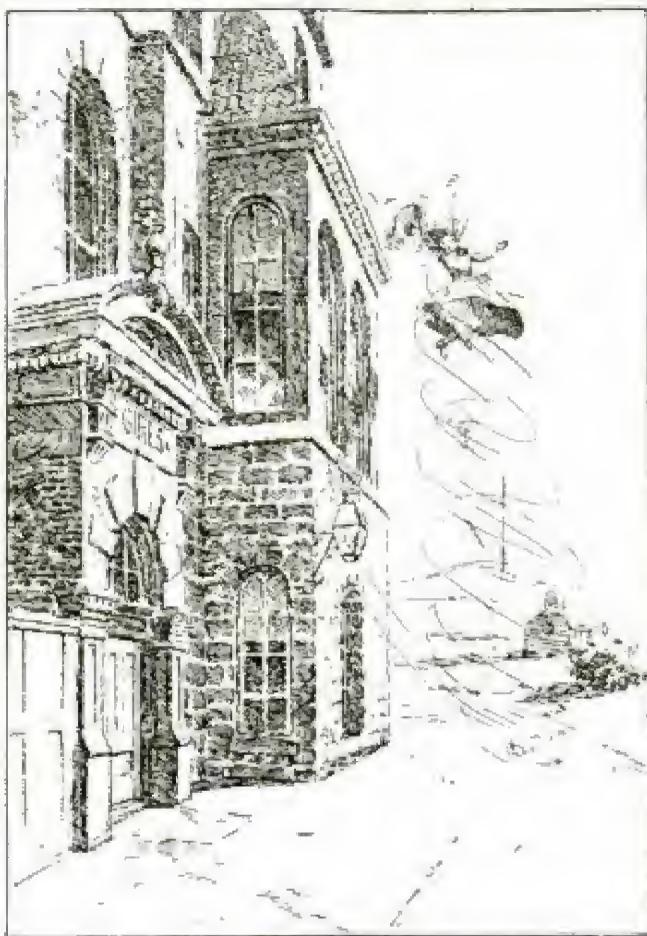
A large living room and dining room, combined, and two bedrooms with alcoves are the distinctive features of this \$2,500 small house plan, which won one of the New York Building Trades Employers' Association prizes. Alcove bedrooms are not common in houses of such a character and the architects in this instance have provided a most attractive plan.

The house is to be constructed of concrete and the specifications provide

for mill work of moderate price. A side porch or loggia with pergola-like extensions over either side and the end, add to the outward beauty of the design, while the canopy over the entrance softens the severe straight lines of the front. Four rooms and bath are provided for in the plans, which also make ample provision for closet space. A big fireplace is designed for the living room which is allotted a space 13 ft. by 19 ft. 9 in.

## GIRL BLOWN INTO THE AIR BY WIND AND KILLED

The illustration shows the scene of one of the most curious fatal accidents occurring in England in recent years.



Courtesy Illustrated London News

**How a Girl Was Blown into the Air by the Wind and Killed by the Fall**

A 16-year-old girl, while in the yard of a school at Bradford, was lifted into the air by a gale of wind, and, after rising to a height estimated as 30 ft., fell to the ground and was killed. Witnesses stated that the girl was carried into the air because her skirt was blown out like a balloon.

## FARMER'S MOTOR WAS TOO ISOLATED

That something more than the money for first cost and the will to experiment is needed before electric power can be installed on the farm was learned by a Kansas farmer recently. Attracted by an advertisement that painted the ease of farming with the

aid of electrically driven machinery, the Kansan ordered a complete outfit from a big manufacturing concern. The order was promptly filled and instructions sent as to the wiring and setting up of the machinery. The manufacturer was much surprised to receive a letter from his customer about two weeks later complaining that the motor would not "run" despite the fact that the directions accompanying it had been faithfully complied with. A "trouble" man was hastened to the spot and found that every detail of the setting up and wiring had been properly attended to and there was nothing wrong with the outfit with the single exception that the nearest electric current was some 20 miles away. That was all.

## COUNTING THREE HUNDRED MILLION PEOPLE

The fourth general census of India, taken on March 10, a date specially selected as being an unauspicious one for marriages, festivals, fairs, and other events likely to take people from their homes, was the largest aggregate and uniform enumeration in the world. It covered more than 1,750,000 square miles, or more than the whole of Europe excluding Russia, and took stock of nearly one-fifth the total estimated population of the whole world.

The taking of a census in India is extremely difficult owing to the great diversification of physical features and climate, from malarial swamps and arid deserts to lonely mountain tracts, and from the jungle homes of wild nomadic tribes to the crowded towns. Little more than five per cent of the population, which it is believed will slightly exceed 300,000,000, can read and write. The caste system differentiates the people into 2,000 species of mankind, which are said by one writer to have as little in common in the physical relations of life as the inmates of a zoological garden. The services of over 1,250,000 persons were required for the taking of the census.

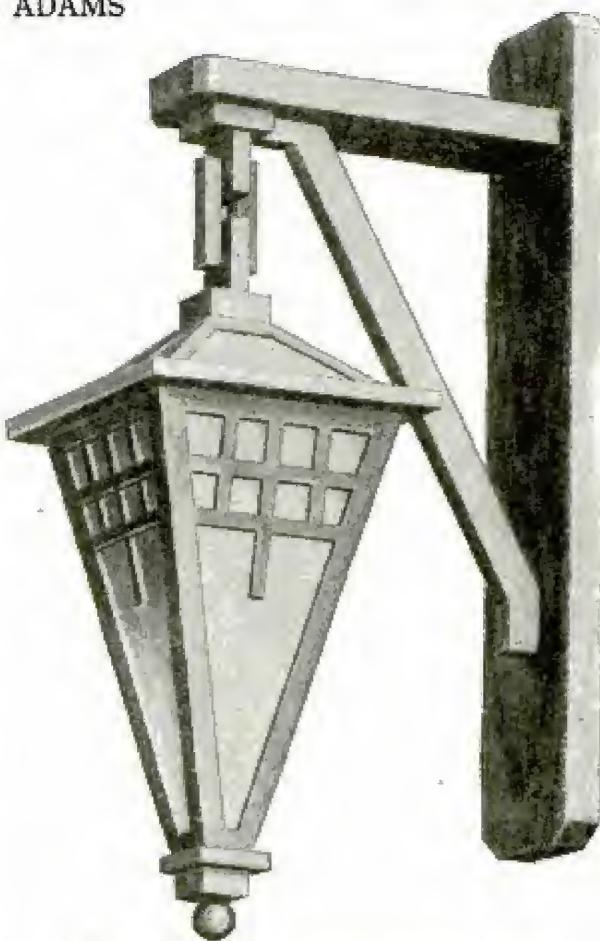
## THE MAKING OF ARTS-CRAFTS LAMPS

By JOHN D. ADAMS

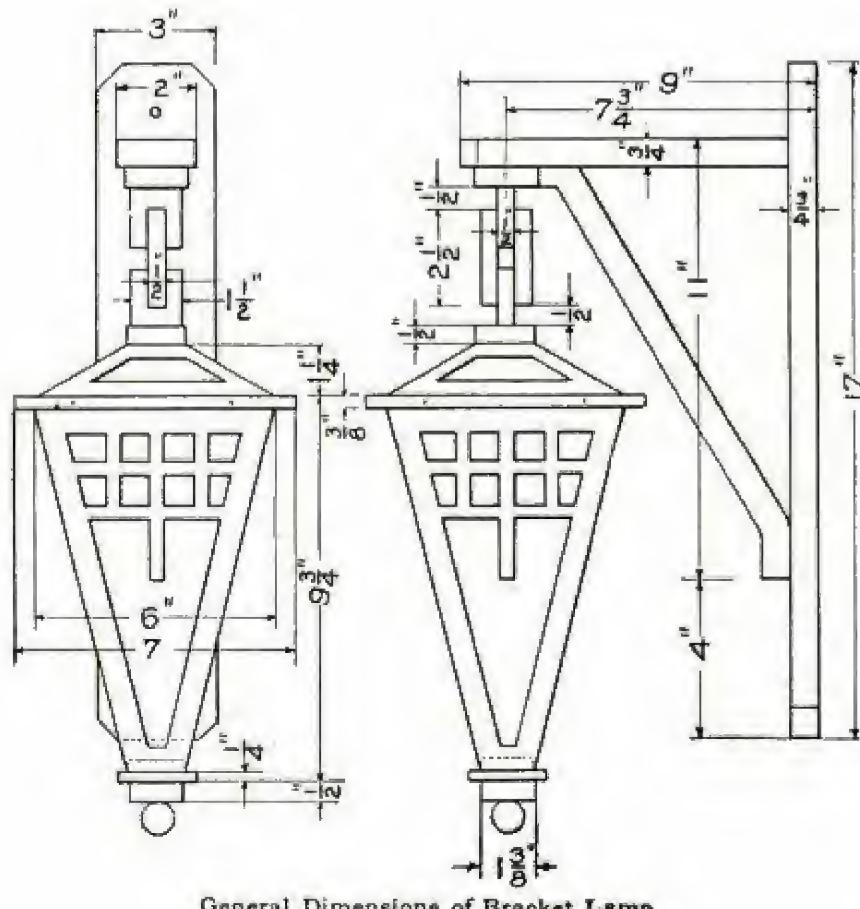
## PART XI — ONE-LIGHT BRACKET

**W**HILE the method of constructing this bracket lamp is along the same lines as those previously described, its successful completion will largely depend on the care and accuracy with which the various pieces are laid out. There are quite a number of small pieces to be fitted and some rather sharp angles, all of which necessitate considerable care. When completed, the lamp is very attractive and will well repay the labor expended. Aside from the electric light and socket, the cost is practically nothing.

The first thing to do is to cut out the pattern for the lower portion of the shade on a piece of heavy paper, which should then be marked off four times on a large piece of cardboard so as to obtain the four sides complete in one piece. In the pattern drawings the dot-



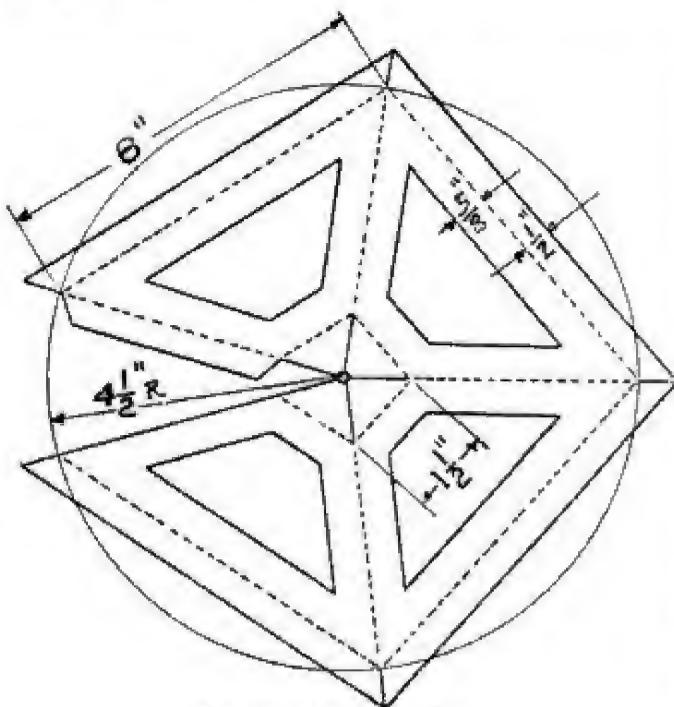
#### An Artistic, Easily Made, Bracket Lamp



#### **General Dimensions of Bracket Lamp**

ted lines indicate those that are to be merely scored with the knife for bending, and the full lines those that are to be cut clear through. After all the cutting has been done, paste on the colored paper, which, if desired, may be of one color for the eight small openings and another for the lower triangular portion. The cardboard should now be bent into shape and the first and last sections connected by means of the extra strip provided for that purpose. The bending can be best done over the sharp edge of a table or board by holding the cardboard down tightly with a straightedge while the projecting portion is gradually bent along the

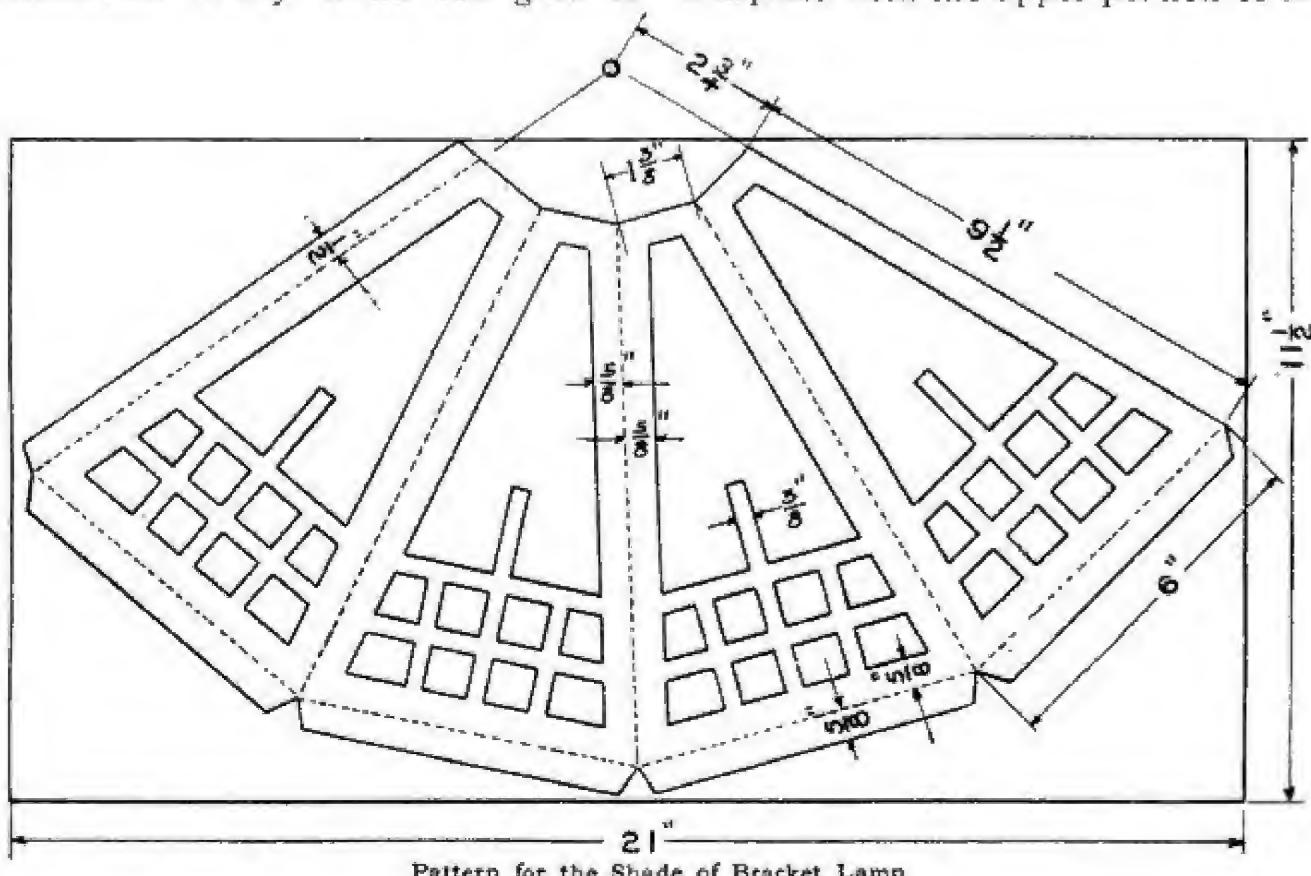
entire length. Passe-partout tape should be applied to the connecting edge and also to the three remaining edges.



Pattern for Lamp Top

Procure a piece of light board, 7 in. square, and cut a 4-in. square hole in the center. Now bend the extra strips at the top inward and glue them to the under side of the board. To hold this connection firmly while the glue is

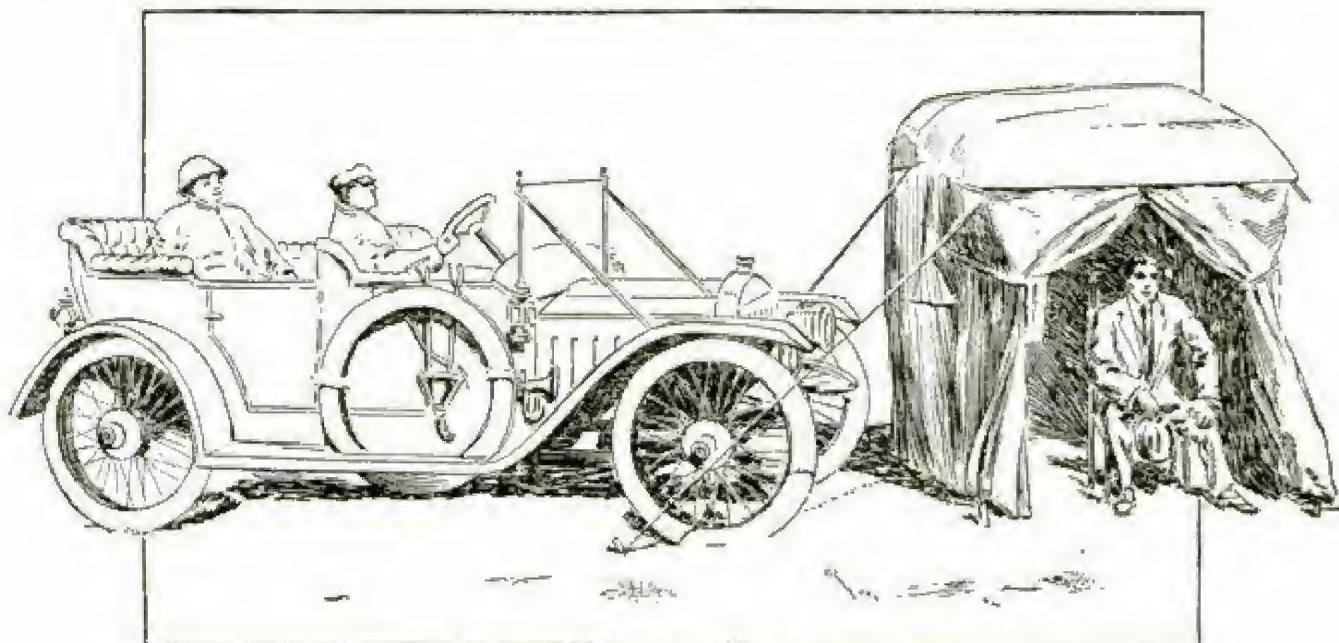
setting, push in a few thumb tacks from the inside through the cardboard into the wood. The lower end is closed with a couple of little blocks and ornamented with a wooden ball such as children play with on the end of a rubber band. This completes the lower portion of the shade, which should now be painted a dull black and set aside. In laying out the pattern for the upper portion of the shade, draw a circle of  $4\frac{1}{2}$ -in. radius, and then space off four 6-in. chords, after which the remaining lines can be drawn in in a few minutes. Bend this into shape and bind the four corner edges with passe-partout tape. Bend the points at the top inward and fasten them to the under side of the small block. The extra strips along the lower edges should now be bent outward, so that they will lie flat on the upper side of the 7-in. board, to which they are to be later attached with thumb tacks. The wooden bracket and the small connecting blocks (supposed to represent a link of a wooden chain) are all so clearly shown in the drawings that the reader will have no difficulty in working them out. After the bracket is complete with the upper portion of the



Pattern for the Shade of Bracket Lamp

shade fastened in place, the cord should be run up through the center and along the top of the bracket arm. Screw the globe into the socket and adjust the lower portion of the shade, and our lamp is complete.

are now being made as to how to obtain the best results. Silhouette moving pictures may in time come to bear the same relation to the regular films as the pantomime does to legitimate drama.



Automobile Hood Set Up as a Tent

#### AUTOMOBILE HOOD AND TENT

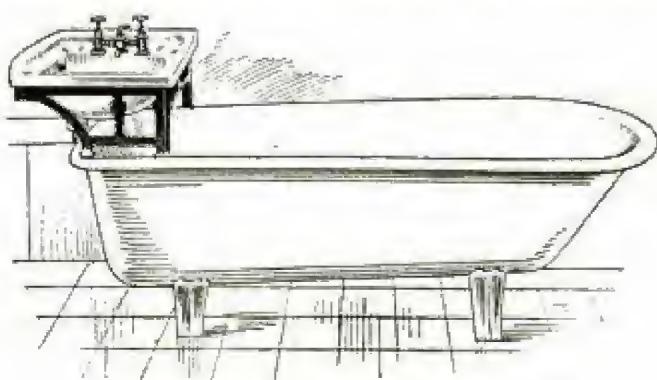
An automobile hood which can be used as a protection for motorists when disembarked for the night, as well as when riding in the car, was especially constructed for C. J. Peerbhoy, of Bombay, India. When used on the car, it has the appearance of an ordinary hood, but its special features make possible a quick conversion into a portable tent.

#### SILHOUETTES THE NEWEST MOVING-PICTURE FAD

Silhouetted moving pictures are the newest things in the film world and the men who are interested in such things commercially are watching closely the results obtained from the first films, on which depends their future attitude toward this peculiar form of picture. The many figures that appear in the pictures are simply shadows with sharp outlines. The manner of making is simple and experiments

#### COMBINED BATH AND WASH BASIN

Restricted bathroom space is responsible for this type of combined bathtub and wash basin. It was de-



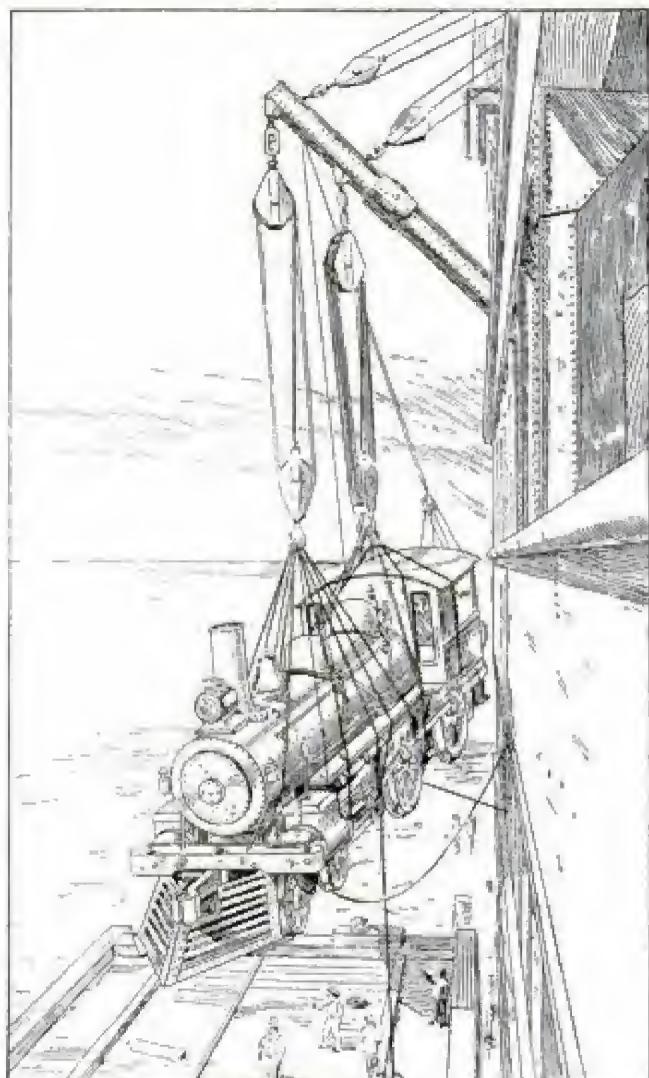
Lavatory Mounted on End of Bathtub

signed for small cottages, especially those built before the bathroom idea spread to England.

A telephone equipment and a collapsible pole for tapping the wires, will be furnished shortly to trains running between Toronto and London, Ont., on the Canadian Pacific Railway.

## LOCOMOTIVE TRANSPORTED OVERSEA INTACT

For the first time in maritime history a railroad locomotive has been picked up by a loading crane, lowered intact to



**Hoisting the 65-Ton Locomotive Aboard Ship**

the hold of the steamer and transported several thousand miles, where it was unloaded in the same manner and run ashore from a railroad barge under its own steam. The feat was accomplished on the Pacific and the locomotive was a 65-ton giant that had been purchased for use on a railroad at Hilo in the Hawaiian Islands. The engine was run to the side of the steamer "Wilhelmina" under its own steam and the fires were drawn. With heavy slings the big piece of machinery and its tender were hoisted on board the steamer and stowed away. On arriving at Hilo, despite the heavy swell running at the time, the locomotive was swung over

the ship's side and placed squarely on the rails of a waiting railroad barge. The barge was run to its slip ashore, the engine driver and his fireman getting up steam on the way. By the time the barge was securely moored, steam was up and the engine was run off to the shore tracks. While locomotives have been transported to all parts of the world, disassembled, and with the separate parts securely packed, this is the first time one of them was ever transported intact.

## WORLD'S GOLD PRODUCTION IN 10 YEARS

The world's production of gold in 1910 is estimated to have been \$455,-832,000, or sufficient to cover an area of about 8.1 acres, if made into a single coin the thickness of a \$5 gold piece. The total gold produced in the last ten years is nearly eight times this amount, and would cover an area of 64.4 acres, if made into a single coin of the thickness of the American eagle. All of this gold, however, if beaten out into gold leaf, would gild a globe only 22 miles in diameter, although such a sphere would tower nearly five times as high as the Himalayas, the greatest mountains in the world.

Incidentally, it would require about 1,548,000,000,000 lb. of gold to gild the entire surface of the earth with the thinnest of gold leaf, although this leaf is so thin that it would take 360,000 leaves of gold laid flat on each other to make a thickness of one inch. This amount of gold would cost more than \$450,000,000,000,000. That is to say, it would take about a million years, at the rate at which gold was produced in 1910, to obtain enough of the precious metal to gild the earth.

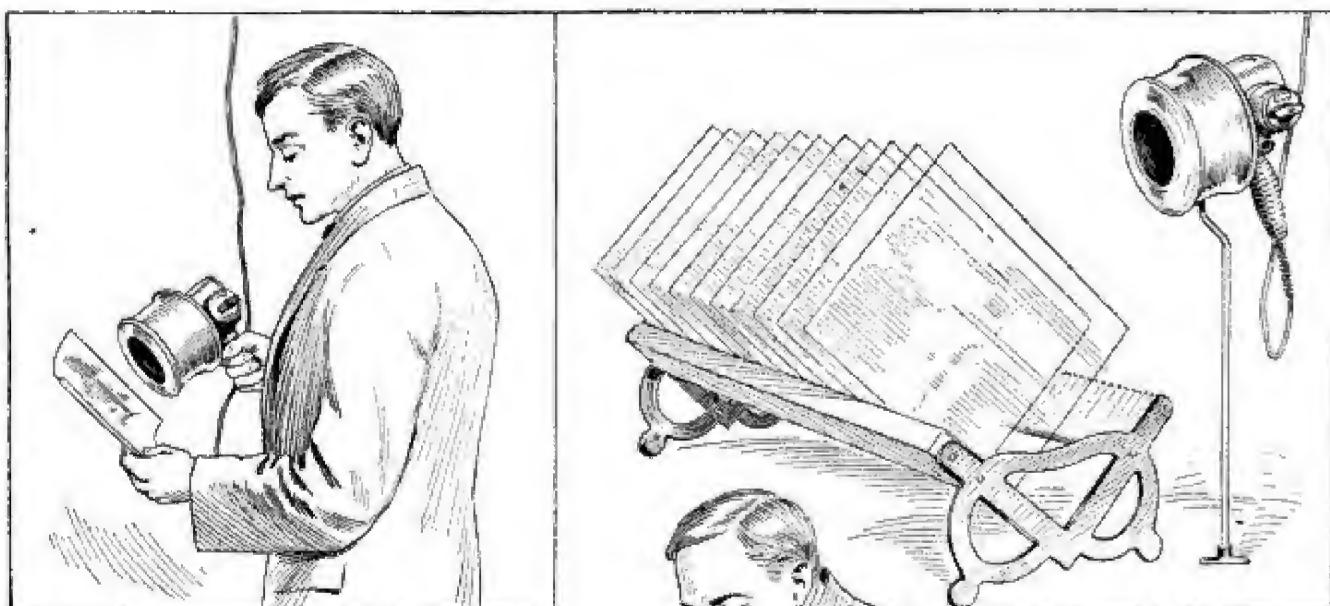
Two Chinese airmen, Li Pao-Chun and Lim Tso-Chen, have erected a temporary building on one of the parade grounds in Pekin for the purpose of conducting experiments in aviation.

## MACHINE MAKES SQUARE DEAL CERTAIN

There is no chance for a misdeal if card players use the machine exhibited at the recent Paris automobile show, designed to give every person in a card game a square deal. The machine consists of a heavy base which supports on its center a toothed disk and a pivot around which the remainder of the apparatus may be turned. The dealing part of the device consists of a rectangular frame in front of which is a small platform on which the cards

are placed. The cards are brought in firm contact with a rubber cylinder. The rubber cylinder will grip and carry off one card from the package and will deposit it in front of the first player to be dealt a hand, when a button is pressed. Releasing the button, the cylinder picks up another card and swings to the second player and so on throughout the deal, depositing a card at a time in front of each person to be dealt a hand with mathematical precision and accuracy. The machine is so adjusted that only one card can be dealt at a time.

## ELECTRICAL APPARATUS FOR PHOTOGRAPHY



Using an Electric Hair-Dryer to Dry Prints

Drying Negatives with the Hair-Dryer



Mounting Prints by the Aid of an Electric Flatiron

Many electrical devices, designed for altogether different purposes, are finding a field of usefulness in the developing branch of photography. An electric hair-dryer and flatiron are shown as examples. The former, which is one of the many electrical devices of hair-dressing parlors, can be used for drying both negatives and prints. The current of warm air

from the dryer can only be directed on one negative at a time, but the drying is accomplished in 15 min. When prints are being so dried, they should be fastened to a board to prevent curling. The electric flatiron is said to give excellent results in mounting prints. Gum tissue is placed between the print and the cardboard, and the electric iron is then applied.

## COMBINATION PNEUMATIC AND SOLID TIRE

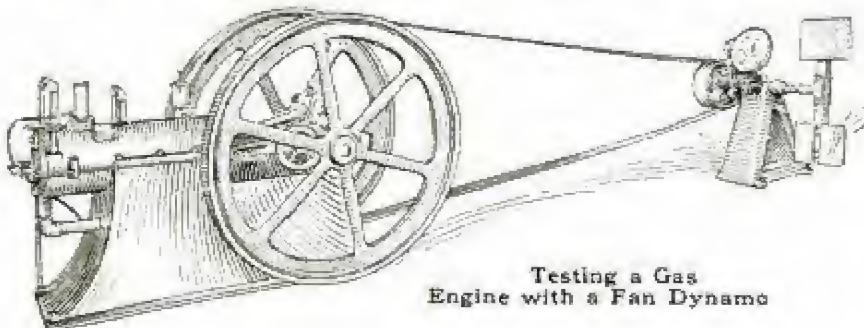
This combination solid and pneumatic tire for automobiles possesses several good features. The metal side rims, one of which is detachable, completely inclose the inner air tube and also that part of the tire which has to withstand the pressure of the air in the tube. The outer tire of solid rubber is practically puncture-proof. The combination tire appears to be able to absorb most ordinary shocks, but does not seem to have the same easy-riding properties as the ordinary pneumatic when passing over small obstacles.

## A WIRELESS SYSTEM WITH NO SPARKS OR ARCS

By using a machine which generates an electric current that reverses in direction over 100,000 times a second, a German scientist has produced a system of wireless telegraphy that

## TESTING ENGINES WITH A FAN DYNAMOMETER

A simple form of dynamometer designed by a New York inventor utilizes



the resistance of the air against the paddles of a two-bladed fan to absorb

needs no spark gaps, "singing" arcs, or such like devices to set up the etheric electric waves from the wire network or antenna (as it is called) of the transmitting station. It is claimed that the time of the day and the atmospheric conditions do not affect the working of the apparatus, which, if true, will prove a great advantage over other wireless systems. It is further said that there is no limit as to the distance over which messages may be sent, although it must be that the radius of the apparatus depends on its power. A machine that has been tested since April of last year gives an electrical output of 17 hp. at an efficiency of 80 per cent. The inventor claims that machines of 80 or 100 hp., or even more, may readily be constructed.

## HARDENED COPPER

Hardened "copper," which is really a hard bronze, is now being made on a commercial scale in this country. It is said to be capable of taking a keen edge, and is especially useful for making fish knives, as it is not affected by the action of sea water.

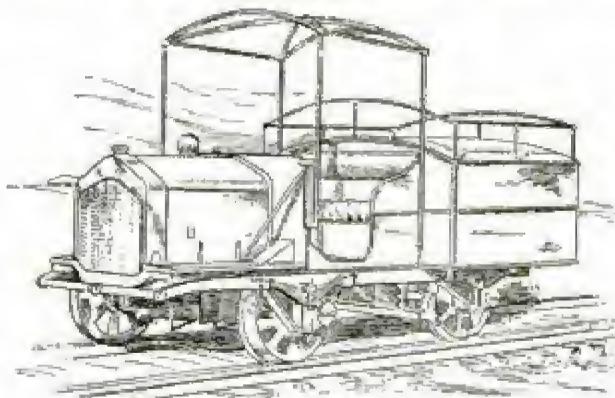
The tempering of copper is one of the so-called "lost arts" of the ancients. It would seem that this particular lost art has been re-discovered.

the power of the engine under test. As this dynamometer operates best at a high speed, the engine is geared up by means of a belt and pulley so that the fan runs at a speed of several times that of the engine. A tachometer, or speed indicator, is connected to the dynamometer and the speed of the engine is obtained by dividing the reading on the dial by the number representing the ratio of the diameter of the engine fly-

wheel (plus the thickness of the belt) to the diameter of the dynamometer pulley (also plus the belt thickness). The dynamometer is simpler than a hydraulic or electric brake and is useful for absorbing the power of the engine while testing for horsepower, for "running in" an engine, or for working down the piston rings, bearings, etc.

### AUTOMOBILE MAIL VAN ON INDIAN RAILWAY

A novel automobile mail van has been placed in service on the Kalka-Simla Railway in India. The car has a length of 14 ft. and a breadth of  $5\frac{1}{2}$  ft., the rear section of the body consisting of a receptacle for the mail bags. Mail may also be carried on the roof, which is railed. The car is driven by an engine of about 25 hp., and the speed gears



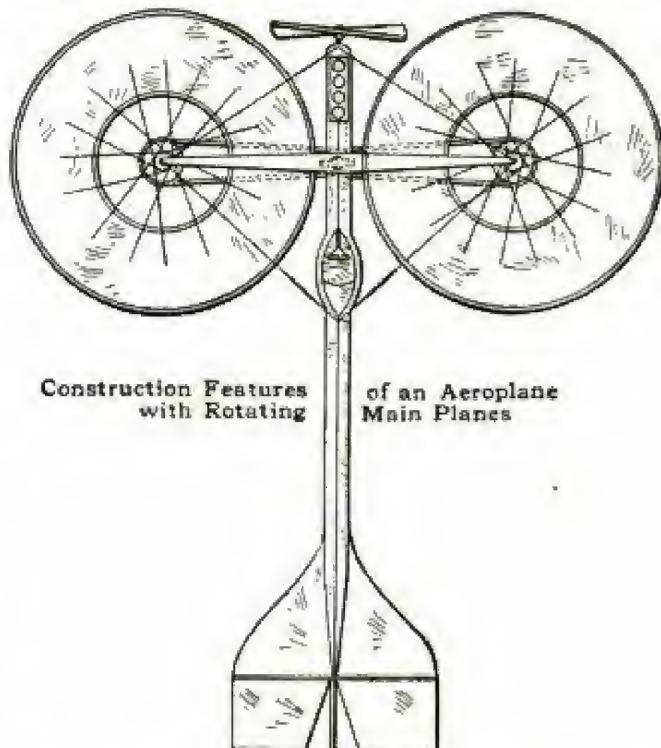
Rail Motor Van Which Carries Mail into Mountains of India

are especially heavy. Considerable power is required both in driving and control, as the car has to climb grades of 1 in 30 up to Simla, which is 7,000 ft. above sea level.

### ROTOPLANE AEROPLANE

Instead of the rigid main planes used on the standard types of monoplane and biplane, this curious aeroplane, the invention of two Australians, utilizes, as its main supporting surface, two circular planes designed to rotate in opposite directions, at a speed of about 300 revolutions per minute. The circular planes are built like bicycle wheels, and the inventors assume that the rotation in opposite

directions will have a sufficient gyroscopic effect to assure perfect equilib-

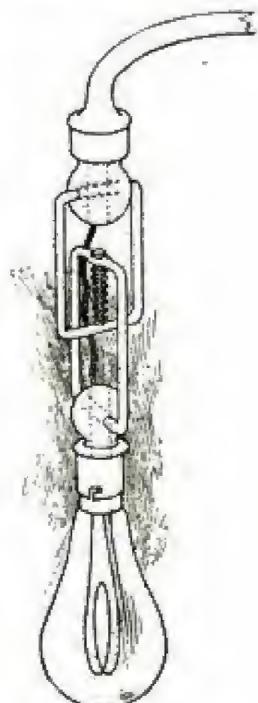


rium regardless of sudden squalls or strong adverse winds.

### ELASTIC SUSPENSION FOR TUNGSTEN LAMPS

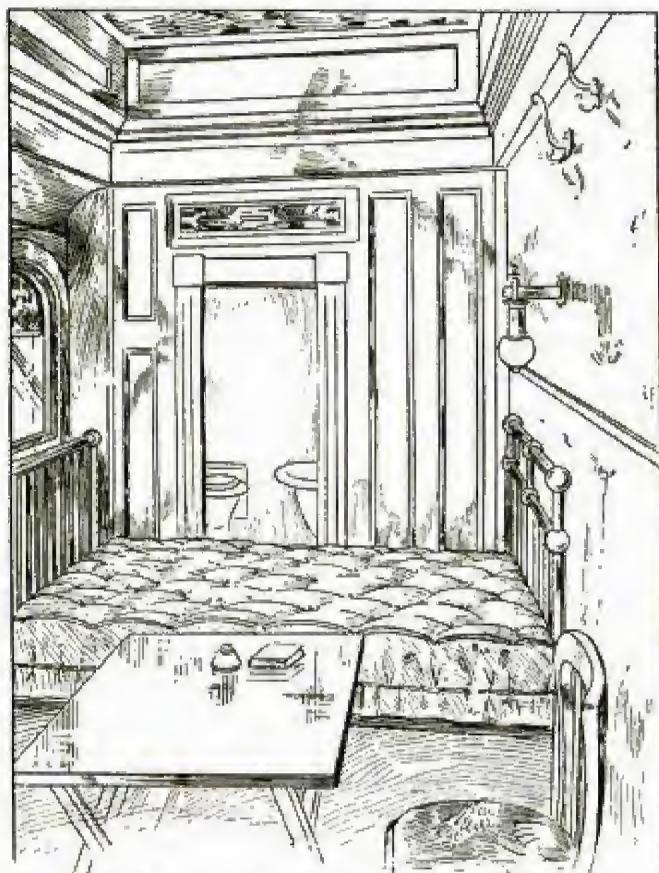
The fact that the filaments of tungsten lamps are very brittle, and therefore liable to breakage from the slightest shock, has led a French concern to devise the shock-absorbing suspension shown in the accompanying illustration. Both vertical and lateral shocks are absorbed.

**Quinine** stands first on the list of drugs used in the tropics, with Epsom salts next and then comes calomel, castor oil, tincture of iron, opium and brandy. A large majority of the drugs used being those that have been known to the medical world for two generations or more.



## DE LUXE SLEEPING CARS FOR NEW YORK ROAD

The corridor compartment cars attached to the night expresses leaving



One of the Compartments on Sleeping Cars Running Between New York and Boston

New York for Boston, and Boston for New York simultaneously at 1 a.m. on the New York, New Haven & Hartford Railroad, are the most luxurious cars to be found on any road in this country, exclusive of private cars.

These cars contain seven compartments, each having an independent toilet and dressing room. In each compartment is a full-length brass bed, 4 ft. wide, two chairs, a folding table, and an electric fan. By means of a thermostatic control apparatus, each passenger is enabled to regulate the heat in his compartment in accordance with his own desires.

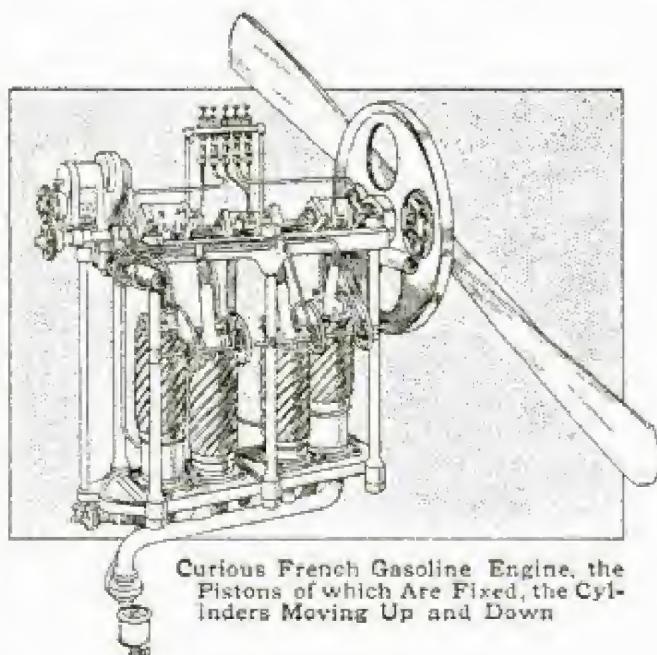
A plan to increase the egg-laying proclivities of his hens by the use of tungsten electric lamps in the hen house during the winter months, has been proved successful by an electrician of Battleford, Saskatchewan, Can.

## SILENCES THE EXHAUST OF MOTORBOATS

The campaign against noise in New York has resulted in the elimination of much of the whistling by boats in the North and East Rivers, and now there has been introduced a muffler for motorboats that does away with the noise of the exhaust almost entirely, without depriving the boat of power. The gases are led gradually with increasing expansion from the engine cylinders and are gradually relieved of their heat by an even admixture of cold water vapor until the gases are cooled and they are then exhausted through an opening in the boat's side above the water. The noise made cannot be heard a cable's length away.

## GASOLINE ENGINE WITH STATIONARY PISTONS

Completely reversing the general practice, the pistons of this curious French gasoline engine are firmly attached to the base and it is the cylinders that move up and down. The spark plugs are inserted in the tops of the cylinders. The pistons carry the valves, which are regulated by a cam shaft located underneath. As shown in the illustration, the outside cylinders are just completing the up-stroke and the inner cylinders are down.

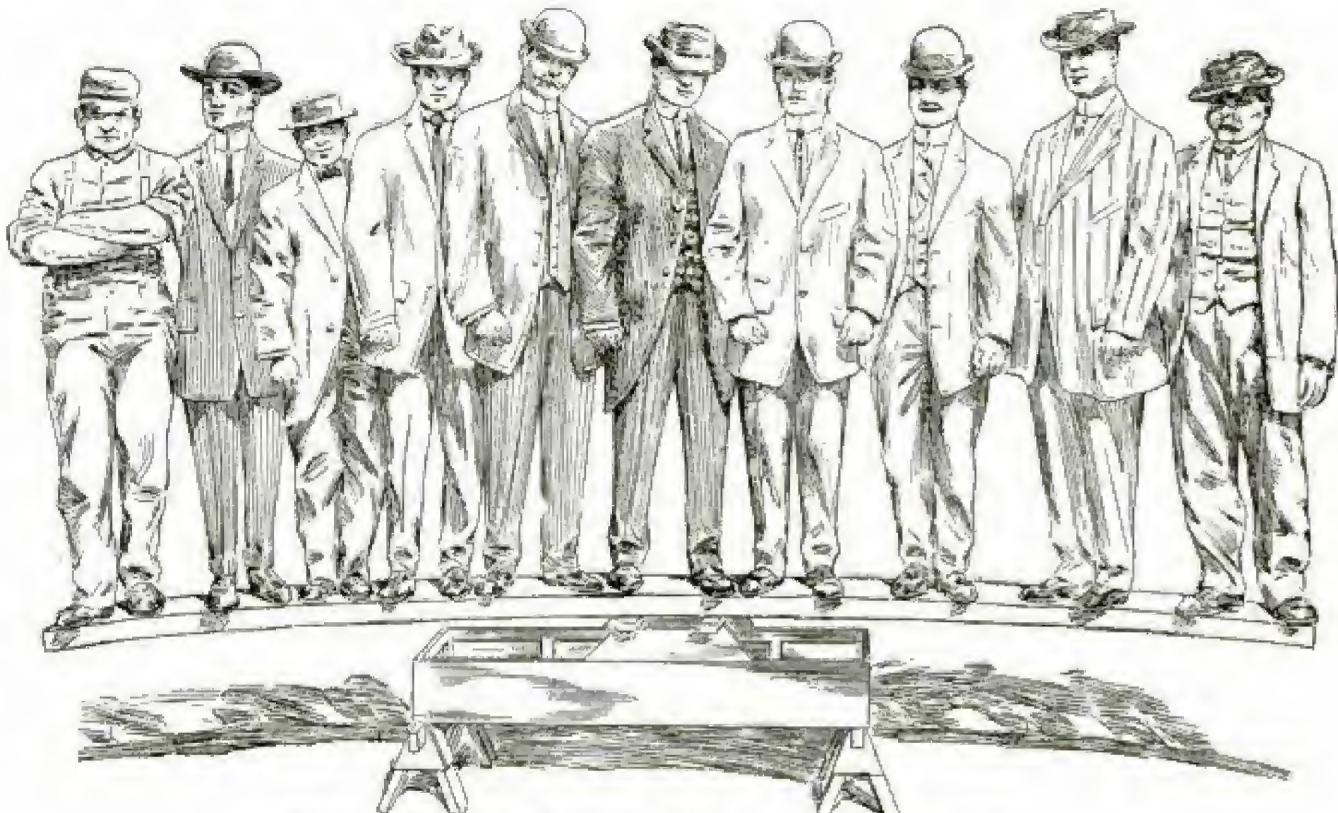


Curious French Gasoline Engine, the Pistons of which Are Fixed, the Cylinders Moving Up and Down

## UNIQUE TEST OF STEEL VEHICLE BODY

A carriage manufacturer who is now making buggy seats and bodies of pressed steel instead of wood, demon-

Telephones in mines are a comparatively recent innovation. Wireless telegraphy has the advantage over telephony in that there are no wires to be put out of order by possible accidents.



Steel Vehicle Body, Supporting Combined Weight of 10 Men

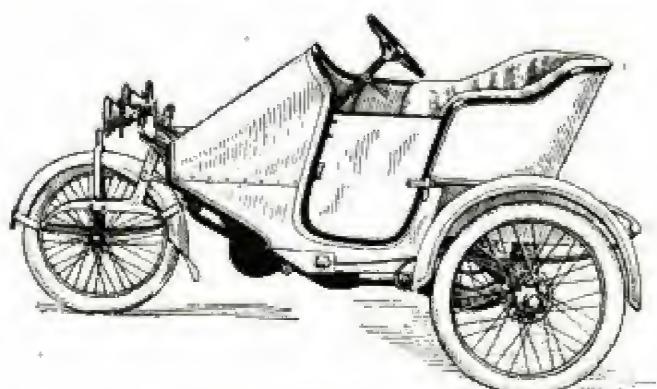
strates the strength of these bodies in the manner shown in the illustration. The body is supporting 10 men, the combined weight of whom is 2,067 lb. The whole weight is resting entirely on the seat risers instead of being distributed around over the whole body to minimize the strain.

## SUBTERRANEAN WIRELESS

An important aid to the safeguarding of lives and property in subterranean mines is the discovery of a successful system for wireless telegraphic communication under the earth. The experiments were made by two German scientists, Drs. Leimbach and Loewy, in the potash mines in the North Harz mountains in Germany. Wireless messages were very clearly received through a distance of nearly a mile and a half, at a depth below the surface of 1,600 ft.

## GERMAN MONOCAR

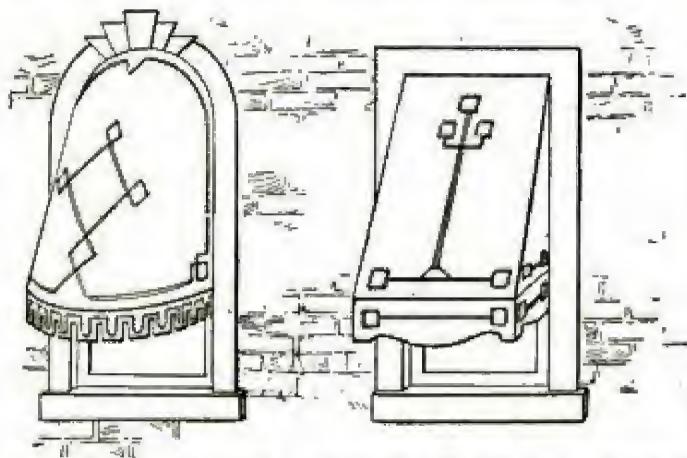
This new German monocar is a cross between a motorcycle and an automobile. The body is of the torpedo type with expanded scuttle dash. The seat is luxuriously upholstered, and the steering is by wheel. Double forks are utilized for the mounting of the front wheel.



One of the Latest Productions of the German Motor Manufacturers

## STENCIL DECORATIONS FOR AWNINGS

There is a growing demand this year, especially for country and suburban homes, for awnings having an appliqué or stencil form of decoration,

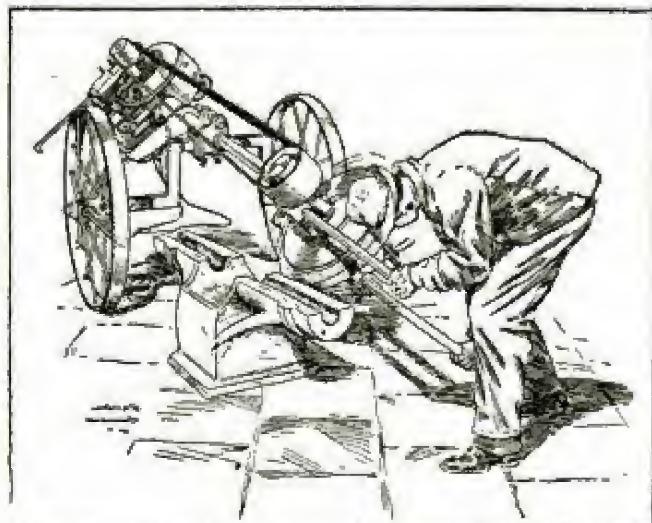


Several Examples of Awnings Decorated with Applique or Stencilled Designs

the colors most in demand for the design being green, blue, red, brown and maroon, on white. The under side of these awnings are being painted to render them opaque, but considerable difficulty is being encountered in coloring the under side with a fast color, and at the same time preserving the outside whiteness and the pliability of the duck.

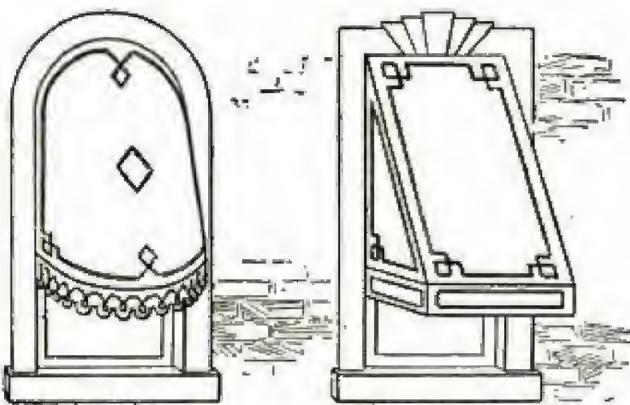
## PORTABLE SWING-FRAME EMERY WHEEL

A remarkably effective mounting for awkward grinding work has been developed by a manufacturer of



Electrically Driven Grinder Mounted on Portable Swing Frame. The Motor Develops 5 Hp.

emery wheels. The motor is supported on one end of the shaft and the wheel head on the other. The shaft is free to swing in the bearing on the axle, but is retained in balance by an adjusting screw which takes care of any variation in balance due to the



wearing of the wheel. The whole is mounted on a pair of 42-in. wheels.

## NEW INSTRUMENTS FOR THE PRACTICE OF MEDICINE

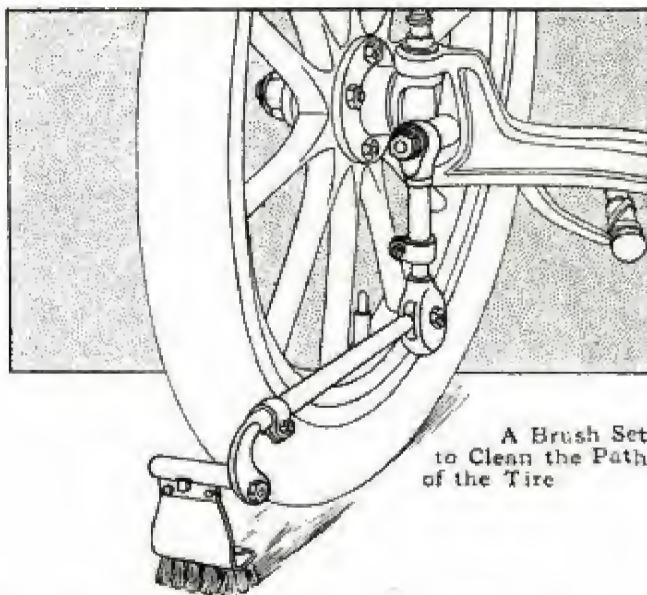
A German physician has devised a sprayer for iodine that permits the free use of this chemical in the dressing of wounds and eliminates all danger of discomfort and bad results through the violent caustic properties it possesses in its soluble form. Surgeons have been forced to use the utmost care with iodine in the past because the alcohol with which the solution is made tends to contract the tissues and the liquid sometimes decomposes, forming a caustic that is extremely painful. This is eliminated by applying the iodine in a gaseous form at a high temperature. Air is heated by being forced through a platinum coil heated with an electric current. Passing through the iodine container directly in front of the coil, the air evaporates the chemical and the whole is forced through a platinum screen and out the nozzle of the instrument in the form of a spray. The instrument is small and is easily handled.

Another new instrument for surgeons is an electric pharyngoscope

which consists of two tubes which can be rotated, one containing the optical arrangement and the other a small electric lamp. An indicator in the eye-piece end of the instrument gives the position of the prism so that the operator may know just which region of the throat he is viewing at all times.

## BRUSH CLEANS PATH OF THE AUTOMOBILE

The brush shown in the illustrations is one of a pair set before the front wheels of the automobile to clear from the path of the tires such articles as pieces of glass, nails, sharp stones, etc. The brushes are set to just clear the ground, so as to avoid continually



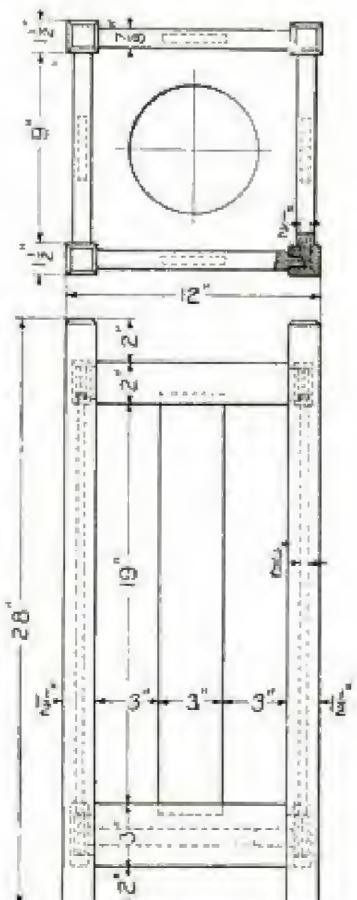
brushing and the consequent raising of dust, but are sufficiently low to brush aside small objects lying on the road surface.

## THE METALLIC LUSTER OF INSECTS

The coppery luster of a certain beetle, explained Prof. A. A. Michelson, at a recent scientific meeting in Chicago, is produced by a thin surface film, the thickness of which he estimated as  $1/254,000$  in. One beetle sent to him for examination looked so much like a bit of brass that he thought, until he had made tests, that some one had had it electroplated by way of a joke.

## HOW TO MAKE AN UMBRELLA STAND

4 posts,  $1\frac{1}{2}$  by  $1\frac{1}{2}$  by 28 in., S-4-S.  
 4 top rails,  $\frac{3}{4}$  by 2 by 10 in., S-2-S.  
 4 lower rails,  $\frac{3}{4}$  by 3 by 10 in., S-2-S.  
 4 slats,  $\frac{3}{4}$  by 3 by 20 in., S-2-S.  
 1 bottom,  $2\frac{1}{2}$  by 10 by 10 in.



the side slats as shown. Try all the joints and see that they fit tight and square. Glue two sides of the stand together and let them dry for at least 24 hours, then glue the remaining parts, being careful to get everything together perfectly square.

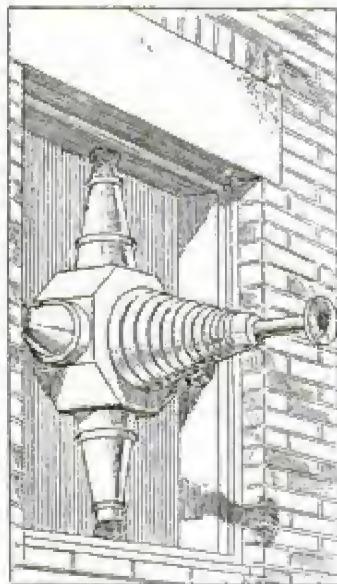
The bottom board can now be fitted in place. It should have a hole cut in it for the drip pan. The pan should be about 6 or 7 in. in diameter. One suitable for the purpose can be purchased in any hardware store. The bottom board can be fastened to the rails with nails driven from the under side, or cleats can be nailed to the rails for it to rest upon.

When the stand is complete scrape all glue from about the joints and go over the whole with fine sandpaper, removing all rough spots. Apply the finish you like best, or the one that will match your other furniture.

### HIGH-TENSION OUTLETS

The type of high-tension entrance and outlet conductors used at Niagara by the Ontario Hydro-Electric Power Co. in its 110,000-volt transmission system is shown in the accompanying illustration. The conductor is a copper tube set in a porcelain tube about 6 ft. long, surrounded by a porcelain bushing 40 in. long. The supports by which each outlet is fixed in the center of its 5-foot-square opening in the wall are four in number, placed at right angles. The openings are fitted with plate glass.

Under wet test these insulators withstood a pressure of 220,000 volts without leakage.



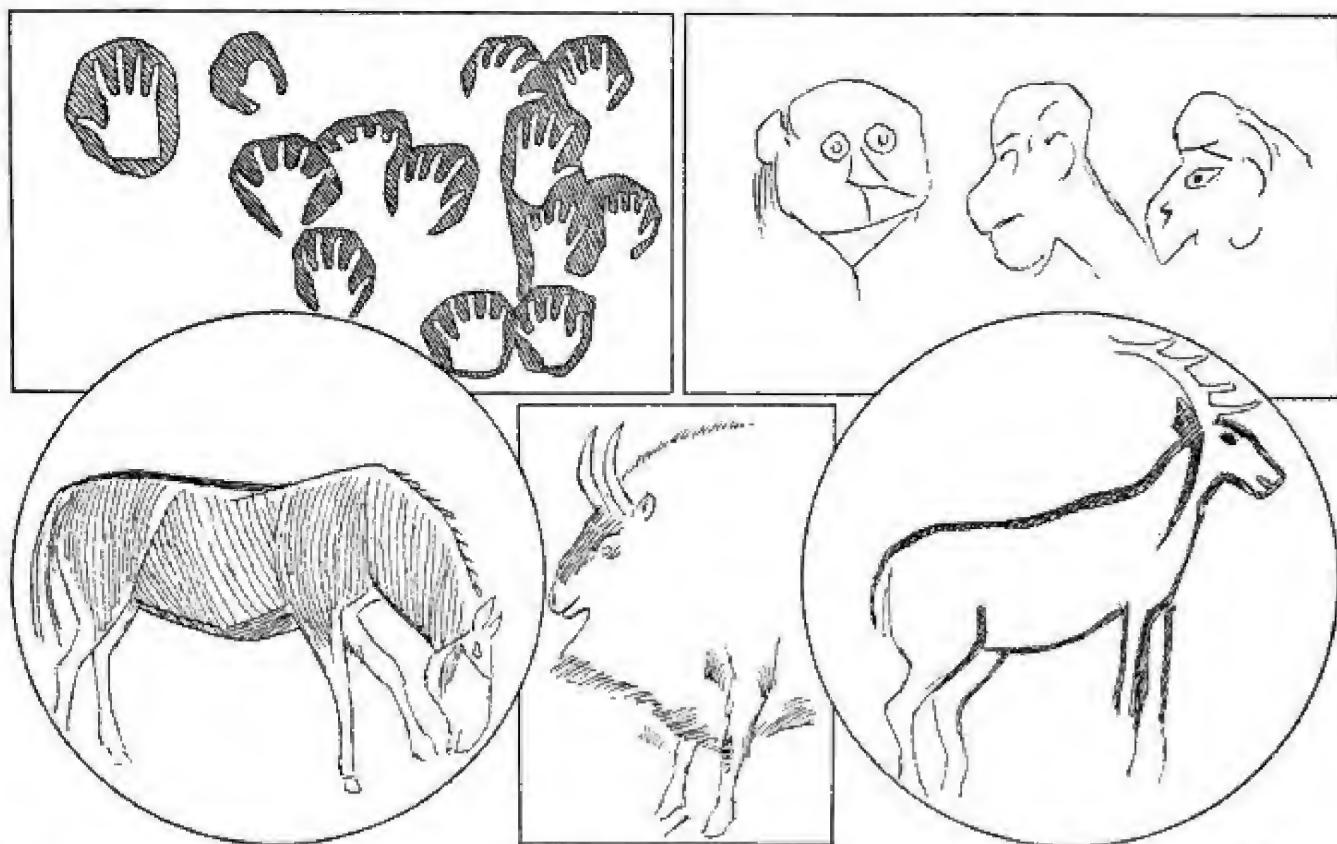
### NITROGEN AND CARBONIC ACID PRESERVE EGGS

Eggs as fresh in flavor after 10 months' storage as when newly laid, are claimed by means of a treatment and method of cold storage recently adopted in France. The eggs are placed in galvanized iron cases, so constructed as to allow a free circulation of air around each egg. A small quantity of anhydrous (that is, perfectly dry) chloride of lime, serving to absorb the moisture from the surrounding atmosphere, is placed in each case, and the covers are soldered on. A hole,  $\frac{1}{16}$ -in. in diameter in the top of each case is left open for the withdrawal of the air in the cases and the admittance of the gases utilized in the subsequent treatment.

These cases are then placed in a cylinder from which the air is exhausted, and perfectly dry carbonic-acid gas, slightly heated, is substituted for the withdrawn air. When the pressure becomes slightly in excess of that of the outside air, the injection of carbonic-acid gas ceases, and the pressure gradually becomes lower as the gas is absorbed by the whites of the eggs. When the pressure indicator becomes stationary, which shows that the whites have ceased to absorb the carbonic-acid gas, a certain amount of the gas is pumped out of the cylinder, nitrogen is admitted under pressure, and is in turn absorbed by the whites of the eggs. Finally the supply of nitrogen is shut off, the cylinder opened, and the small holes in the tops of the cases closed with solder.

The treatment thus incloses the eggs in an atmosphere of dry carbonic-acid gas and nitrogen, but no oxygen, the proportions of the gases being the same as found in the whites of new-laid eggs. The cases are then stored as usual in a temperature of from 32 to 35 deg. F., but no attention need be paid to the humidity of the storage rooms.

The cost of the treatment, including cases, but not the expense of installing the plant, is 80 cents per 1,000 eggs.



Drawings by Artists of the Stone Age—Human Hands Drawn by Placing Hand Against Wall and Following the Outlines, and Drawings of Human Heads and of Animals Found on Walls of Caves in the Pyrenees

## PAINTINGS AND DRAWINGS OF THE STONE AGE

On the northern slope of the Pyrenees, France, are three caves which were used by prehistoric man in the stone age as dwellings. They have a special interest over several like caves recently discovered, because of the paintings and drawings that cover the walls, ranging in size from 6 or 7 in. to as many feet. The variety of subjects is rather limited, and among them the bison and horse predominate. A scarcity of human likenesses would suggest a superstitious fear of self-portraiture, and those that have been found are real caricatures, childish in conception and execution. In this respect they contrast strongly with the, in many instances, excellent pictures of animals, of which the horse and bison are excellent examples.

One of the caves is rich in human hands, made by holding the hand outspread against the wall and painting around it. Out of 144 hands, only eight represent the right hand, which is conclusive proof that man was right handed as far back as the stone age.

## UNLOADING PIG IRON WITH ELECTRIC MAGNETS

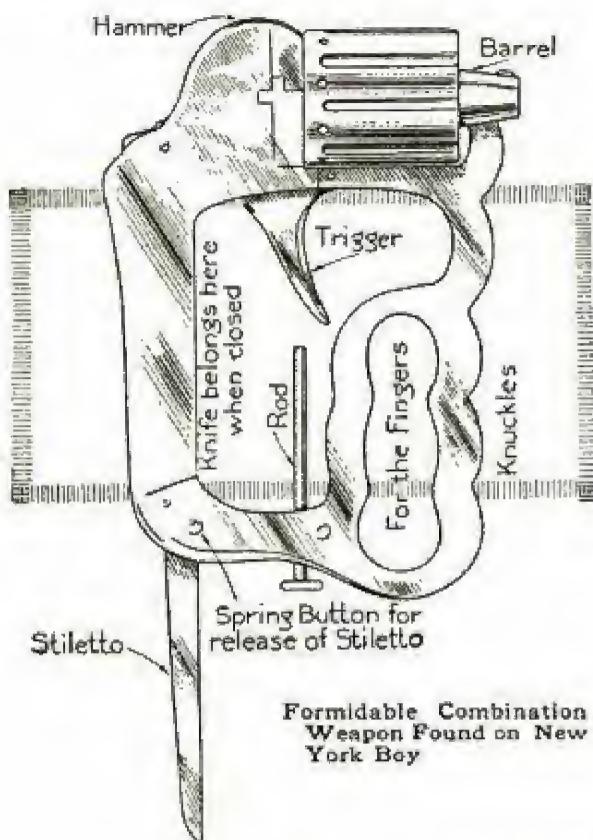
Two 62-in. electric lifting magnets recently unloaded 4,000,000 lb. of pig iron from the hold of the Great Lakes steamer "Erwin L. Fisher" in 10½ hours. The vessel docked at 7.15 in the morning, and the work commenced 20 min. later, continuing with an interruption of half an hour at noon for oiling and inspection, until the task was finished. In all 1,281 lifts were made by the two magnets, the average lift per magnet being 3,122 lb.

## EXTENSIBLE MAST THAT WINDS UP

One of the latest types of extensible mast, which among other uses is adapted for portable wireless outfits, winds up like a steel tape measure. The mast is square in section and consists of four interlocking steel strips that are fed from four reels through a square hole in a guide plate. Steel brace plates, encircling the mast, are automatically placed at intervals as the mast is extended.

## REVOLVER, KNUCKLES AND STILETTO COMBINED

The arrest of a 16-year-old school boy in New York recently divulged a combination weapon of a type unfamiliar even to the police of that city.



It comprises a revolver, stiletto and knuckles, in the form shown in the accompanying illustration. The stiletto extends downward from the rear base of the revolver grip, when required for use. When not in use, it is hidden in the revolver grip, from which it is released by means of a spring button.

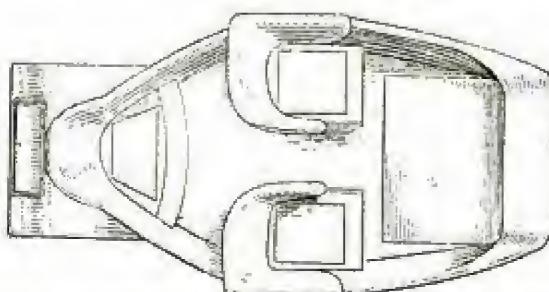
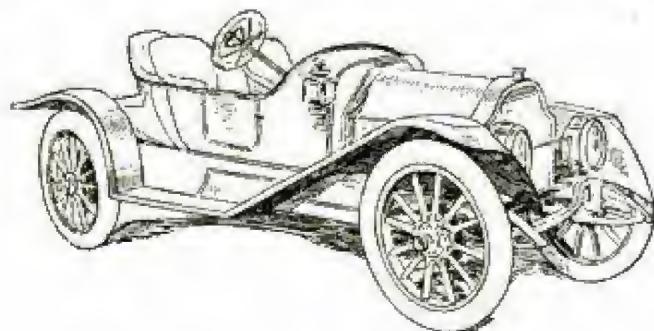
## EXPERIMENTS DETERMINE SHAPES OF FISH

Additional evidence of the influence of environment on living things is found in the experiments recently conducted by a French scientist with fish models. These experiments were conducted with a bag made of flexible material filled with a plastic substance and tightly sealed, the bag being without shape of any particular kind. The experimenter placed his apparatus in a tank and drew it through the water at

varying speeds, noting the effect of the passage each time. He found that when the bag was pulled through the water rapidly, it soon assumed the most common shape of a fish, the upper and lower portions of the front and the lateral portions of the rear end flattening, leaving the greatest bulk of the body nearer to the front end. The varying speeds produced variations of this shape and indications were found as to the arrangement of fins suitable for the various forms of fish from the bull-nosed to the flat and cylindrical. From these experiments, fish models were constructed and many interesting scientific theories were tested.

## "DUCK BOAT" BODY FOR AUTOMOBILES

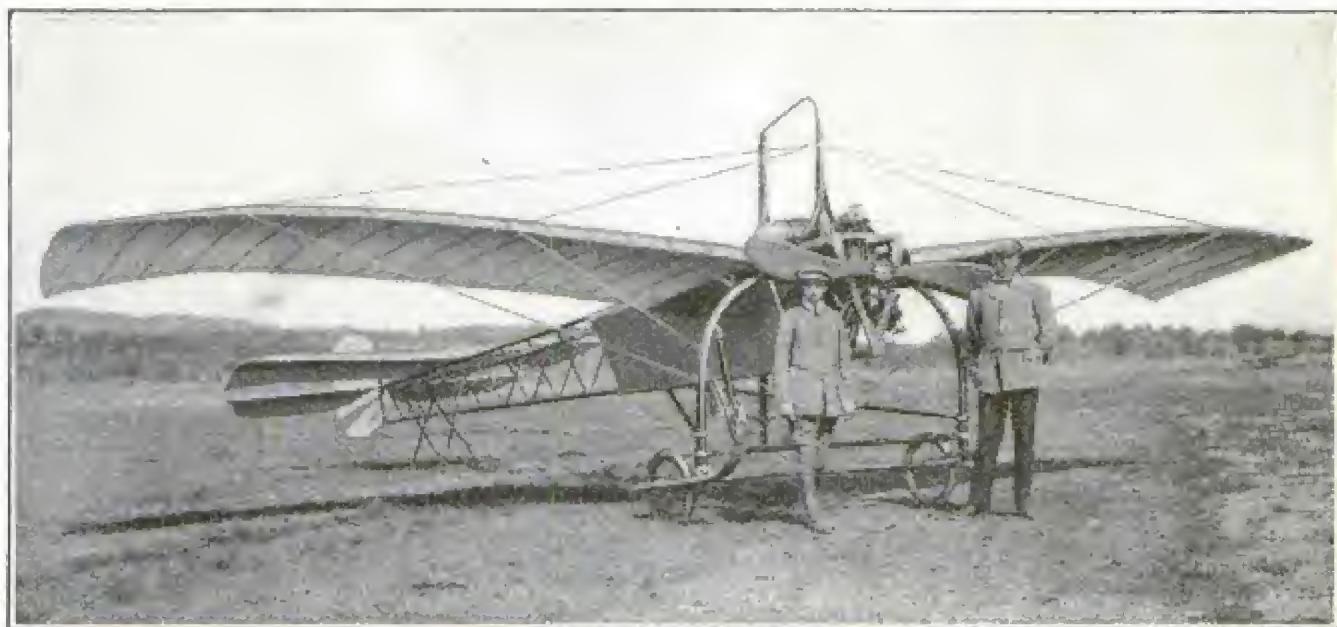
The new automobile body turned out by a motor car company of Dayton, Ohio, is called the "duck boat" because of its peculiar shape. It is a radical departure in body design, there being but one door, on the left side at the front. The occupant of the single rear seat enters through this door and passes between the two front seats. Mud aprons, attached to the fenders,



Two Views of the "Duck Boat" Automobile Body

protect the lamps and radiator from being splashed by the mud thrown up by the front wheels.

## TWO NEW FRENCH AEROPLANES



New Monoplane "Erg," with 50-Hp. Viale Motor



M. Paulhan, not satisfied with his previous flying machines, has just constructed a biplane with flexible and warping extremities. It has a 50-hp. Gnome motor, weighs 880 lb. and has a wing surface of 474 sq. ft.

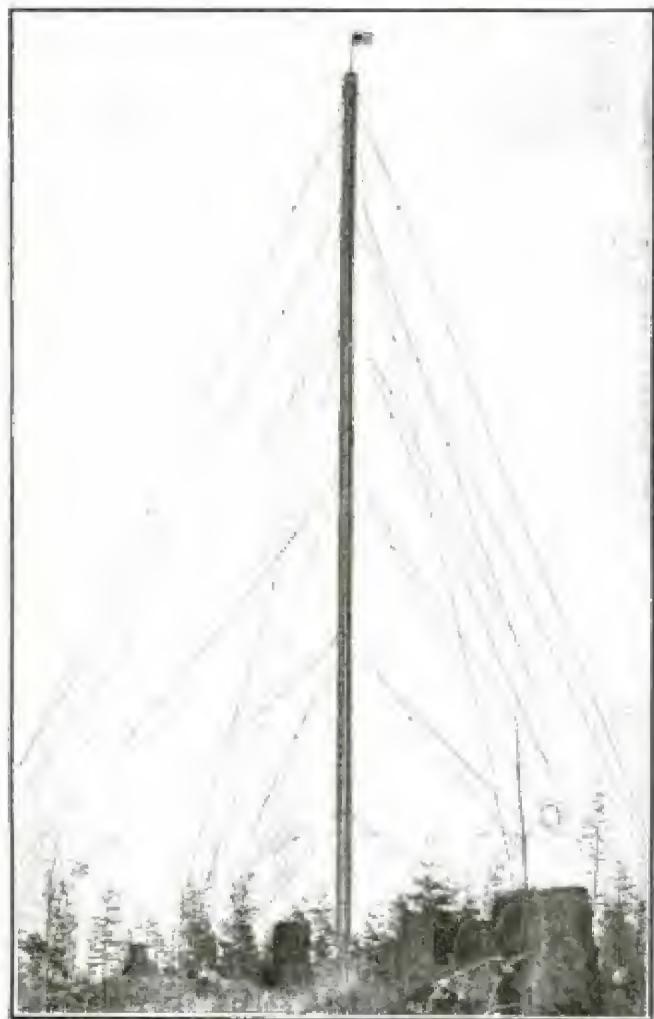
### ATHLETICS MAKES WOMEN'S FEET LARGER

If woman insists upon being a golfer, an equestrian, a walker or an out-of-door person generally, she must content herself to have large feet. One of the largest shoe manufacturers in the country has just discovered that the feet of the women of today require a shoe 5½ C in size in place of the 4½ B size worn ten years ago. The calcu-

lations were based upon the orders received for shoes for women during the last year and for a like period ten years ago. Thousands of orders were examined and an average struck. An investigation was made as to the cause, and from the results of this, it has been determined that the prevalence of the athletic spirit among women is responsible. It was also found that the height and weight of the average woman have increased considerably in ten years.

## A HIGH WIRELESS TOWER ON THE PACIFIC

One of the highest wireless telegraph towers in the United States has been completed recently in Seattle.



Wireless Tower 320 Feet High on Pacific Coast

Rearing 320 ft. above the ground, it stands on a hill 500 ft. above the level of the sea.

When the entire system of antenna wires is completed, 40,000 ft. of wire will have been used. These wires will stretch from the top of the tower like the ribs of a gigantic umbrella to eight masts each 100 ft. high and 500 ft. from the base of the tower.

According to William Dubelier, the Seattle man who has invented a successful wireless telephone, this tower will give his telegraph plant a working radius in the daytime of 2,500 miles, and at night probably 3,500 miles. If this proves to be the case, then messages can be sent from Seattle to Alaska or Honolulu direct or even

to Chicago and Atlantic coast points. The great antenna system will cover more than 30 acres.

The tower is constructed of steel and wood and in its center it has an elevator operated by a gas engine. It is the intention of the wireless men to flash signals at noon each day giving the time to boats plying the Pacific Ocean. An arc light of high power will be operated at night on the top of the tower and it is expected it will be visible 40 miles on clear nights.

A 20-kilowatt generator will give the station one of the most powerful outfits in the world.

## VARYING THE ALCOHOLIC CONTENT OF BEER

Prohibitionists and personal-liberty advocates have all the elements of a nice little controversy on the merits and demerits of the true foaming lager and the various "near-beers," in the recent announcement that a brewing chemist has found a simple method of materially reducing the amount of alcohol in beer. This consists in passing carbonic-acid gas, made chemically from soda and sulphuric acid, through the beer at a temperature of about 70 deg. F. Beer having 4 per cent of alcohol, treated in this manner, lost about 95 per cent of its intoxicating principle, but became flat in the process, without, however, losing any of its nutritive qualities or palatability. Another peculiar thing was that the beer was restored to its original condition by passing the same kind of gas through it at a much lower temperature.

Whether this research will lead to anything in the nature of a commercial dealcoholized beer remains to be seen.

CA new form of arc lamp, claimed to be of extraordinary efficiency, has its arc between a piece of metallic tungsten and a pool of mercury, placed a short distance apart in a vacuum or an atmosphere of inert gas.

# The Kingdom of Dust

By J. Gordon Ogden, Ph. D.

THIS is the fourth of a series of articles by Dr. Ogden, who is professor of physics at the Fifth Avenue High School, Pittsburg, Pa. In every home, in every office, in every shop or factory, the fight against Dust is never-ending. Dr. Ogden illuminates this subject in a manner which brings a realization of its infinite importance.

## IV—Earth's Winding Sheet

AH, make the most of what we yet may spend  
Before we, too, into the dust descend.  
Dust into dust, and under dust to lie,  
Sans wine, sans song, sans singer, and sans end.

For I remember stopping by the way  
To watch a potter thumping his wet clay,  
And with its all-obliterated tongue  
It murmured, "Gently, brother, gently, pray."  
*Omar Khayyām*

AS dust was the beginning, so shall it be the end of all things earthly. It is the cosmic undertaker of the ages, and silently, resistlessly, and eternally it has performed its function. The proudest monuments built by man, the Sphinx, the Pyramids, the Colossus of

Rhodes, the Gardens of Babylon and the glories of Grecian art, have either crumbled to the dust whence they sprang or have been buried deep in its winding sheet. So far as human grandeur is concerned, even "imperial Caesar, dead and turned to clay, might



THE ROMAN FORUM AS IT LOOKS TO-DAY

Every Wind Carries Away Dust Particles of this Once Proud Monument of a Mighty City

stop a hole to keep the wind away!" No one knows how many Londons or Jerusalems there have been. Excavations into the dust on which these cities are built reveal the relics and remains of former cities which once flourished and were mighty, but were finally entombed in the course of untold centuries by the gradual but immense deposits of dust and debris. When Macaulay's New Zealander shall muse in profound melancholy upon the shattered remains of London Bridge, he will behold a vast battlefield, where half-buried columns and desert sands shall proclaim the final sovereignty of dust.

How many cities, like Nineveh and Babylon, and numberless cities of the plains, are known to us only by a few shards and other fragments of pottery, drifting about in deserts of shifting sand?

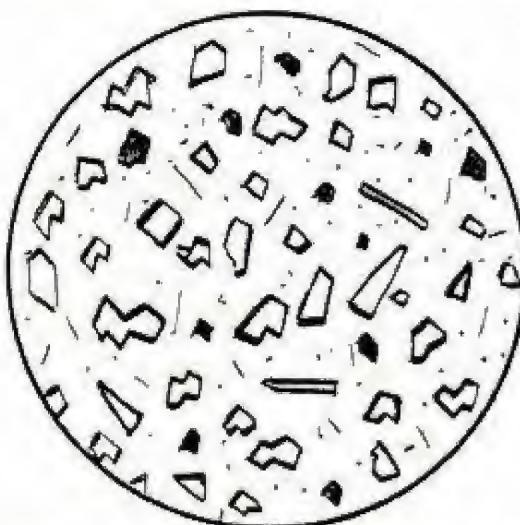
The mighty Himalayas, whose snowy summits have as yet defied the foot of man, are slowly crumbling into dust, and the lofty peaks of the Andes are splintering, fragment by fragment, until they, too, shall become clods of the valley. Every wind that blows "soft o'er Ceylon's Isle" carries away in tiny

dust particles some of its beautiful hills and vales. Every brooklet trickling down the rugged mountain side bears part of a continent to the sea. Every

year the Mississippi River carries down to the gulf little motes of matter, river-worn dust, amounting to over  $7\frac{1}{2}$  billion cubic feet. In 3,500 years, the Mississippi cuts down its entire basin one foot, and as the mean height of the continent is only 2,000 ft., were the process to go on uninterruptedly, North America would be reduced to the sea level in about 7,000,000 years. When we stop to consider what the other great rivers of the globe are doing, such as the Nile, the Yang-tse-kiang, the Yukon,

and the Danube, we can appreciate in some measure the everlasting waste that is eating away great continents, and foresee the inevitable supremacy of the Kingdom of Dust.

Volcanoes are active agents in the formation and distribution of dust. On August 27, 1883, a violent explosion took place on the island of Krakatao, in the Sunda Strait. Half of the island was destroyed. According to official evidence, the explosion was heard at a distance of 1,800 miles, and the air wave that accompanied it, injured buildings hundreds of miles distant. Immense quantities of dust, some coarse, some fine, were projected into the atmosphere. This dust, the fragments of a volcanic island, was carried into the upper atmosphere and some of it circled the entire globe twice



Dust from the Eruption at St. Pierre, Magnified 500 Times, Showing Angular Fragments of Dust



Sand Dune Destroying Forest at Cape Charles, Va.  
These Dunes Overwhelm and Destroy Every Living Thing in Their Path

or thrice before it finally disappeared. The brilliant sunsets, glorious in their chromatic splendor, that characterized the years of 1883, 1884, 1885, and 1886, were due to the minute dust particles from this volcano. And even to this day, after almost three decades have elapsed, it is quite probable that dust from Krakatao is still flitting aimlessly in space, silently moving throughout the profound wastes of the aerial sea. Possibly some of the finer dust, attaining the higher reaches of the atmosphere and impelled by the pressure of light, has left the confines of earth forever and has begun an age-long wandering into the awful abysses of interstellar space.

The volcanic outburst of St. Pierre with its tremendous outpouring of dust, in May, 1902, is still fresh in the minds of all. Professor Jagger, of Harvard University, who visited Martinique the day following the greater outburst, wrote: "I looked toward the gray old volcano, whose summit was shrouded, but the lower slopes were sunlit, silent, and powdery; the whole landscape is powdery, like old statuary with a dust coating, that makes stronger the modeling of the city."

The most dramatic description of a volcanic eruption, ever penned by man, was written by Pliny the Younger, in a letter to Tacitus. After a preliminary account of the eruption of Vesuvius, he said: "At length, preceded by a strong sulphurous stench, a black and dreadful cloud, skirted on every side by forked lightning, burst into a train of fire and igneous vapor, descended over the surface of the ocean, and covered the whole bay of the crater, from the island of Capreae to the promontory of Misenum with its noxious exhalations; while the thick smoke, accompanied by a slighter shower of ashes, rolled like a torrent among the miserable and affrighted fugitives, who, in the utmost consternation, increased their danger by pressing forward in crowds, without an object, amidst darkness and desolation; now were heard the shrieks of women, screams of children, clamors of men, all accus-

ing their fate, and imploring death, the deliverance they feared, with outstretched hands to the gods, whom many thought about to be involved, together with themselves, in the last eternal night. Three days and nights were thus endured in all the anguish of suspense and uncertainty; many were doubtless stifled by the mephitic vapor; others, spent with the toil of forcing their way through deep and almost impassable roads, sank down to rise no more; while those who escaped spread the alarm, with all the circumstances of aggravation and horror, which their imaginations, under the influence of fear, suggested. At length a gleam of light appeared, not of day, but fire; which, passing, was succeeded by an intense darkness, with so heavy a shower of ashes, that it became necessary to keep the feet in motion to avoid being fixed and buried by the accumulation. On the fourth day the darkness by degrees began to clear away, the real day appeared, the sun shining forth sickly as in an eclipse; but all nature, to the weakened eyes, seemed changed; for towns and fields had disappeared under one expanse of white ashes, or were doubtfully marked, like the more prominent objects, after an Alpine fall of snow."

If such be the description of this most tremendous visitation, as it affected Stabiae and Misenum, comparatively distant from the source of the calamity, what must have been the situation of the unfortunate inhabitants of Pompeii, so near, of Herculaneum, within its focus? Must we not conclude that, at the latter place at least, most of those not overwhelmed by the torrents of stony mud which preceded others of flaming lava, burying their city 60 ft. under the new surface, were overtaken by the showers of volcanic matter in the field, or drowned in attempting to escape by sea, their last, but hopeless resource, since it appears to have received them to scarcely less certain destruction?

The recent disaster at Martinique recalls to mind the eruption of St. Vincent in the year 1812. A sea

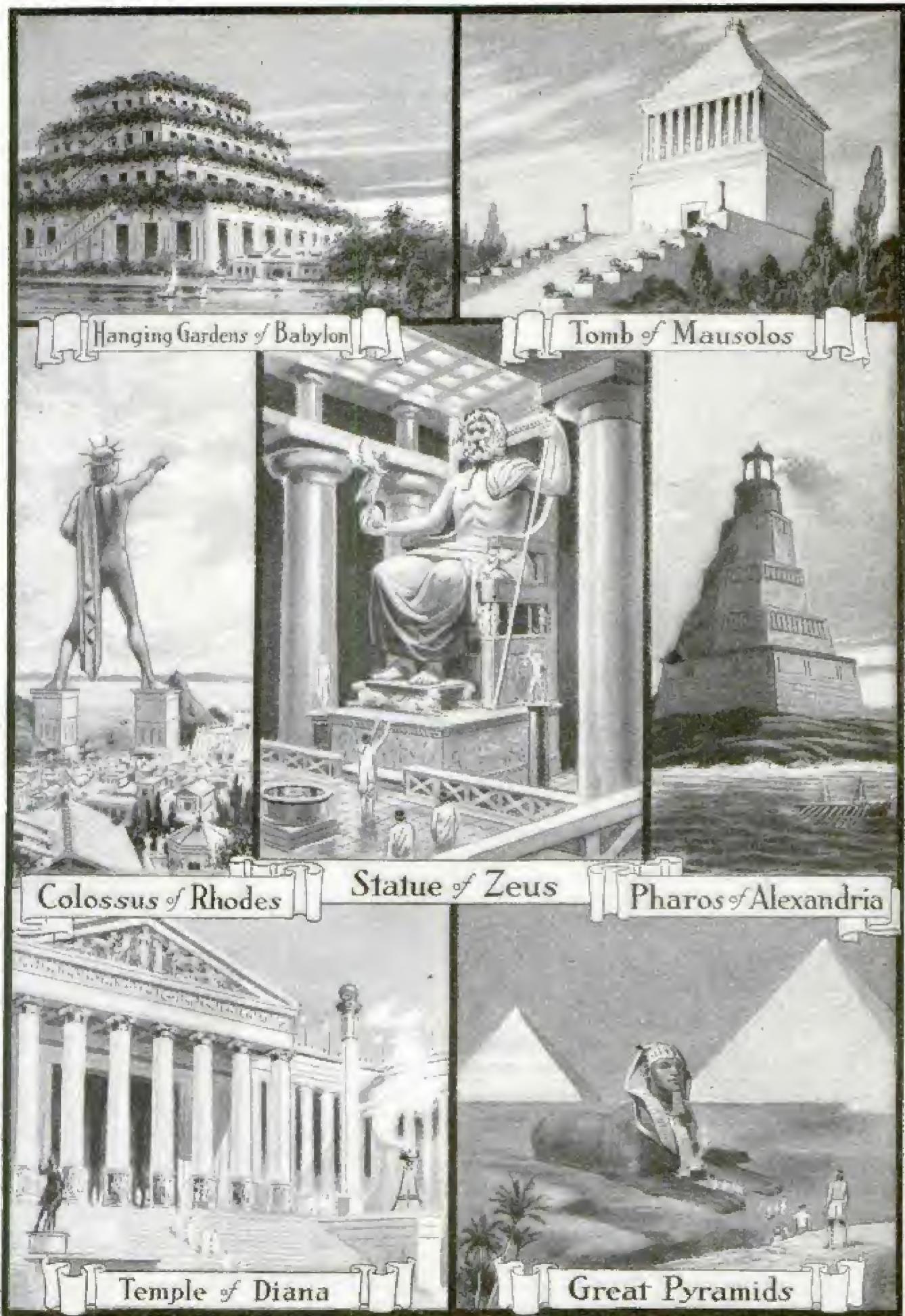
captain, Basil Hall, wrote a very graphic and striking account of this modern Pompeii, and his own words are best in describing it: "On the first of May, 1812, after some violent detonations that terrified the inhabitants of the Barbadoes, a black cloud was descried, seaward, upon the northern horizon. Ere long, it covered the whole sky, which had just been emerging from the shadows of morning twilight. At length, the darkness became such that it was impossible, indoors, to tell where the windows were, while, in the open air, many persons could not see the trees near which they were passing, the outlines of the neighboring houses, or even white handkerchiefs placed a few inches from their eyes. This phenomenon was occasioned by the fall of an enormous quantity of volcanic dust issuing from a crater on the Isle of St. Vincent, and containing, according to the analysis made by Dr. Thompson, 91 parts of silex and aluminum, 8 parts of calcareous matter, and 1 part of oxide of iron. This new kind of rain and the profound darkness it occasioned, did not cease entirely until between noon and one o'clock; but several times during the morning there were noticed by the aid of a lantern, showers, so to speak, in which the dust fell in greater abundance. Trees whose wood was flexible, bent beneath the burden and the noise that other trees made in breaking contrasted in a very striking manner with the calmness of the atmosphere. The sugar canes were completely broken down, and the whole island was covered with a bed of greenish ashes an inch in depth."

In many parts of the world there are dust storms so dense and so frequent that travelers when caught in them are in imminent danger of their lives. These storms are known under various names, such as the harmattan, the khamsin, the sirocco and the simoon. They transport from place to place immense quantities of dust.

That these great dust storms have always been in evidence since the world began is shown by certain geological

formations. Along the valleys of the Rhine and the Mississippi, in Central China, North Germany, Poland, and in the Carpathians, are immense deposits of a peculiar dust known as "loess," a fine powder produced by the grinding of prehistoric glaciers and consequent flood streams. The loess is generally of a brownish or yellowish color, and sometimes has a depth of over 2,000 ft. Pumpelly, in describing the loess of China says: "In Asia, thousands of villages are excavated in the most systematic manner at the base of cliffs of loess. Doors and windows pierced through the natural front give light and air to suites of rooms which are separated by natural walls and plastered with cement made from the loess concretions. These are the comfortable dwellings of many millions of Chinese farmers and correspond to the rude 'dugouts' of Nebraska." This loess is never stratified, and hence was not water-deposited. It is simply dust that has overwhelmed cities and villages and even mountains with a fine powdery deposit. In Central Asia the air is sometimes so thick with sand and dust that it is impossible to read a book at noonday. Along the Caspian steppes, fine clay and sand are constantly drifting, and no plant life can exist where these storms are common. Even in our own country, especially along the seashores, we have many examples of the wastes produced by sand dunes. These dunes, like those on Cape Charles, overwhelm and destroy every living thing in their pathway.

The terrible desolation produced by shifting sands, however, may best be seen in northern Africa. The desert of Sahara is a typical example. Wind-driven, the white, powdery sand sifts ceaselessly over the ancient domain of the Pharaohs. Almost all of northern Africa is now naught but a desert and in a few hundreds of years, the sand will have reached the mountains near the Red Sea; inevitably it will overtop these natural barriers, and march onward into Arabia, carrying ruin and destruction in its train.



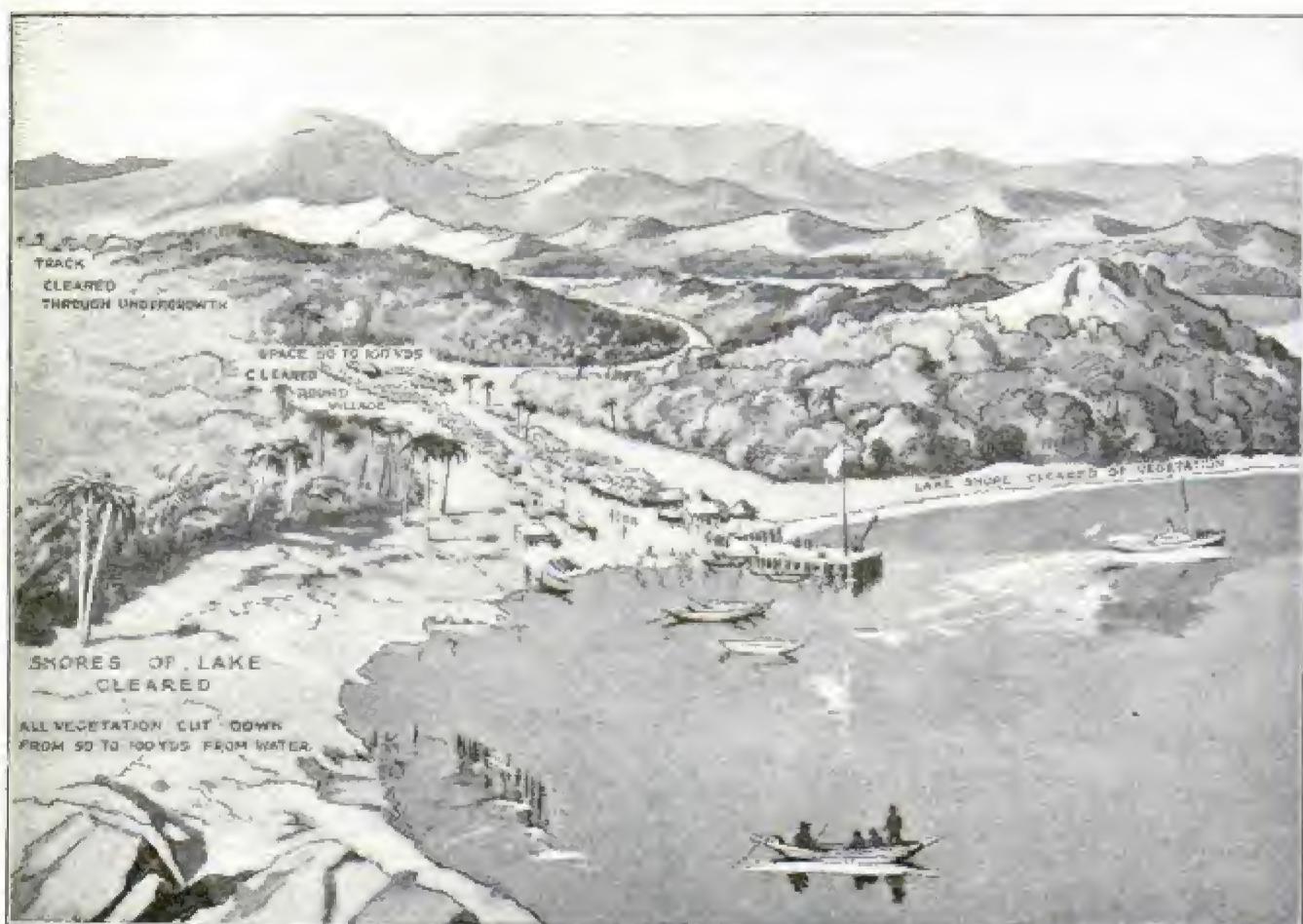
#### THE "SEVEN WONDERS" OF THE WORLD

"The proudest monuments built by man . . . have either crumbled to the dust whence they sprang, or have been buried deep in its winding sheet. So far as human grandeur is concerned, even imperial Caesar, dead and turned to clay, might stop a hole to keep the wind away."

Mysterious, dreamy Egypt, whence has come so much that has made the world wiser, is being slowly entombed by the relentless, shifting sands. The grim and silent Sphinx, wistfully looking afar with its dust-bleared eyes, beholds only wastes of shining sands, where once fair rising uplands, graced with beautiful temples and stately façades, marked the garden-spot of the world. Even the Sphinx itself is

slowly sinking into the dust with its riddle unanswered, its mystery unrevealed to wondering mortals.

Perhaps in some future age, the sands will roll away, Earth's winding sheet will unfold, and again will the Sphinx, the strangest of all the handiwork of man, ask in vain, with lips of stone, its world-old riddle, before it disappears, for all eternity, into the wonderful Kingdom of Dust.



Courtesy the Sphere, London

Northern Shores of Lake Victoria Nyanza Cleared of Growth in Sleeping-Sickness Campaign

### CLEARING THE SLEEPING SICKNESS AREAS

The fact that the tsetse fly, which spreads the sleeping sickness, inhabits the low-lying growth around the lakes and rivers in Africa, and only travels a short distance from such areas, has caused an organization fighting the disease to clear the northern shores of Lake Victoria Nyanza, where one of the most terrible outbreaks occurred. All vegetation has been cut down from 50 to 100 yd. from the water, a space of 100 yd. cleared around the villages, and

tracks 50 yd. wide cleared through the undergrowth to the higher levels.

Two aspects of the disease must be combated in the fight of extermination: first, the infection of human beings by the fly, and secondly, the infection of the fly from infected human beings. All along the northern shores of the lake, the sick have been removed from the infected belt and segregated in camps, where various remedies sent out from Europe have been tried, but with little success. When definite evidence of sleeping sickness appears, the sufferer seems to be doomed.

## THE HAREM SKIRT OBLIGATION FOR AIRWOMEN

Airmen and conductors of aviation schools in France advocate the wearing of the harem skirt by airwomen, and that their advice has not fallen on deaf ears is demonstrated daily at Maurice Farman's aviation field at Buc. The rule is intended to apply to women passengers as well as aviators. Mme. Maurice Farman, who often makes aerial trips, has ordered one of these skirts.

## WOODPECKER CHIPS

A friend of birds, and one who had always supposed that the bits of wood removed by woodpeckers in building nests were like sawdust, discovered, to his great surprise, that the pieces of wood taken out by one member of the woodpecker family were about as large as his little finger. He consequently photographed a few of the chips, including a thimble in the photograph for comparison of size.

The chips shown are considered remarkably large, and were taken out by the flicker or yellow-hammer branch of the woodpecker family. In preparing its home, the woodpecker chisels



Chips of Wood Chiseled out by the Flicker Branch of the Woodpecker Family While Making a Hole for a Nest

out a hole in a tree, then curves the hole downward and builds the nest at the bottom.

## RUSSIAN BALALAIKA HAS TONE LIKE VIOLIN

Many Russian folk songs are arranged for an orchestra of balalaika, the Russian instrument which has been



A Member of the Imperial Russian Court Orchestra Playing the Balalaika

compared in tone with the violin. One of the most important features of the season at St. Petersburg is the series of concerts by the Imperial Court Balalaika Orchestra. The instrument is of many sizes and shapes and the difference in tone procured by the various arrangements of the strings and the sizes of the instruments give the writers and adapters of folk songs a wide range for orchestration. The instrument is said to be the only one that can be compared with a violin, although music lovers who have heard both still give preference to the violin.

An Indiana court has decided that a blind person can collect damages for injuries received while walking along a public road from collision with an automobile, on the ground that the operator of such a machine going at a high rate of speed should make every effort to avoid collision with a pedestrian, and especially with a child or an infirm person, whose legal right to the use of the public highway is unquestioned, so long as they observe due care.



Drawing Room in a Priory Reconstructed This Dining Room in the Home of the Earl of Morley, in Devon, and Decorated by the Brothers Adam England, Was Designed by R. and J. Adam



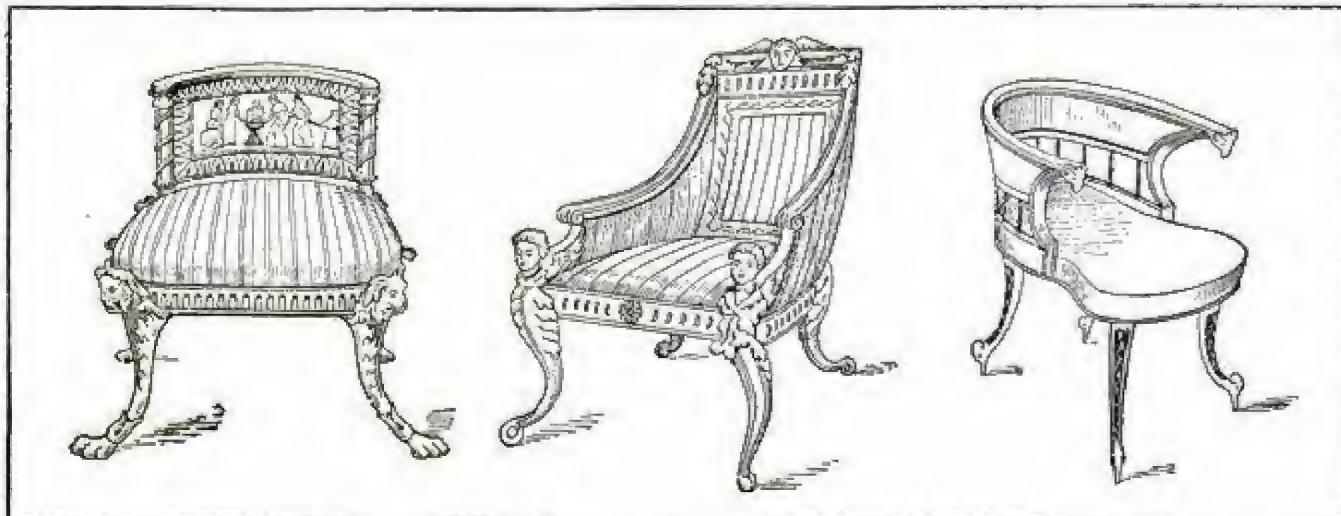
### ADAM TYPE OF INTERIOR DECORATION

Fine examples of interior decoration and furniture designed by R. and J. Adam, whose influence in architecture, interior decoration and furniture design was greatly felt in England from 1765 to 1790, are shown in these illustrations.

The two brothers not only designed walls, ceilings, mantel-pieces, even door knobs and locks—everything, in fact, that went into rooms; but built palaces for the nobility, houses, terraces, bridges, and even streets and squares. The furniture made by them was designed to fit their rooms,

### ALARM CLOCK THAT ACTED AS AN ENGINEER

The automatic stopping of the pumping machinery in five oil wells simultaneously by means of an alarm clock is the simple expedient used by an operator in an Ohio oil field to save himself a midnight trip to his pumping station. This operator was interested in another field and could not work the pumps on the five wells except at night. As is well known, oil wells in some sections of the country cannot be pumped continuously without injuring the properties, and these wells were of that class. They could only be pumped five hours at a time. Such a limit



Chairs Designed to Fit Certain Adam Rooms

Courtesy Upholsterer

would have made it necessary for the operator to make a trip to his pumping station at the end of that time and stop the machinery. But he did not care to do this, and let the alarm clock do it for him.

The plan he adopted was very simple. He removed the bell and striker from the clock and when he started his pumps would set the alarm at a time five hours in advance. To the key with which the alarm was wound he attached a light cord, the other end of which was fastened to a weight that was just balanced on a bench in the engine room. From the weight a stouter cord was run to the gas valve and oil cup of the engine. When the time came for the alarm to sound, the key would turn, pulling the weight from the bench, and in dropping to the floor the weight would pull the heavy cord attached to the gas valve and oil cup, effectually stopping the engine by shutting off the supply of fuel and lubricant.

#### ELECTRIC TROUBLE-HUNTER FOR MOTORISTS

A handy little device for locating breakdowns in inaccessible parts of an automobile is shown in the cut. It is a



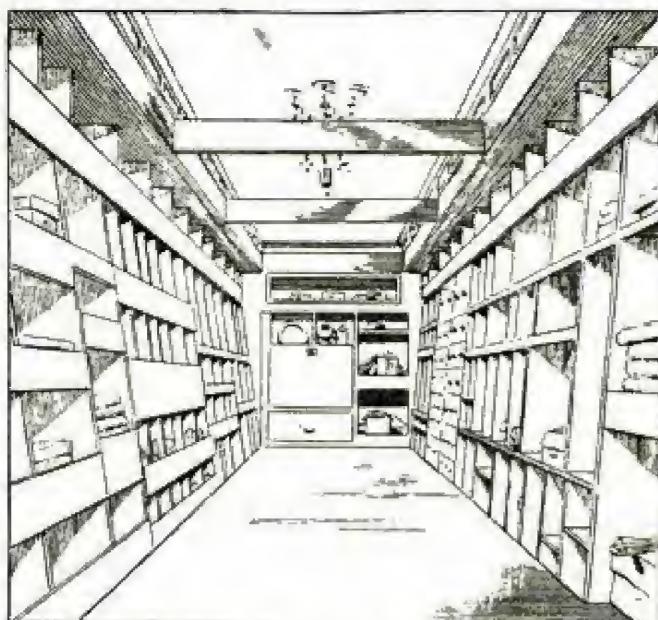
Portable Electric Lamp with Adjustable Mirror

combination of the portable electric lamp with a mirror that can be tilted at any angle by a simple movement of the forefinger.

#### THE SANTA FE'S NEW SUPPLY TRAIN

The new method of handling and transporting supplies adopted on the Albuquerque, Arizona and Los Angeles divisions of the Santa Fe lines is said to make possible the saving of two or three thousand dollars each month.

Small materials of all kinds, such as office supplies, are carried on a special car recently constructed for the purpose, the interior of which is provided



Interior View of the New Supply Car for the Santa Fe Lines

with shelves, pigeonholes, and other receptacles so arranged as to greatly facilitate the work of distribution. For conveying larger and heavier material, flat cars are attached to the main supply car.

The train starts out from a given point on the first day of each month, loaded with all the supplies for renewals and repairs requisitioned from different points. In the main supply car are office supplies of various forms sufficient to last every station agent on the three divisions for 30 days. The flat cars, which vary from five to seven, are loaded with track tools, frogs, switches, cattleguards, farm gates, fence wire, staples, spikes, bolts and practically all articles for renewals smaller than the complete reconstruction of bridges and the erection of buildings.

CA Minneapolis man has arranged an indestructible phonograph record in combination with a loud-speaking telephone instrument on his automobile. A touch of the chauffeur's button causes this noise-making mechanism to hurl the name of the car or any other desired phrase.

## DIRIGIBLE "SUCHARD" BUILT TO CROSS THE ATLANTIC

No contingency that can be foreseen has been overlooked by Joseph Brucker, the German-American jour-

with a car or motorboat built like a canoe, to which the propellers are attached. Equilibrium is to be main-

tained by means of water pumped from the sea. The "Suchard" was built at Kiel, Germany, and was christened by Princess Henry of Prussia. The starting point selected by Mr. Brucker was the Canary Islands and he hoped to land in the West Indies.

The crew as announced by Mr. Brucker, included Captain Joerdens of the German army, pilot; Captain Friedlaender, of the German navy; Mr. Mueller-Peissenberg, chief engineer; Dr. E. Alt, meteorological expert; and Mr. Brucker. The "Suchard" is equipped with two 200-hp. gasoline engines.



The "Suchard's" Car, a Canoe-Shaped Motorboat Equipped with All the Necessities for a Record-Breaking Trip

nalist, who has planned the transatlantic voyage of the dirigible balloon "Suchard." The airship is equipped

ological expert; and Mr. Brucker. The "Suchard" is equipped with two 200-hp. gasoline engines.

## A SKYSCRAPER DISASTER

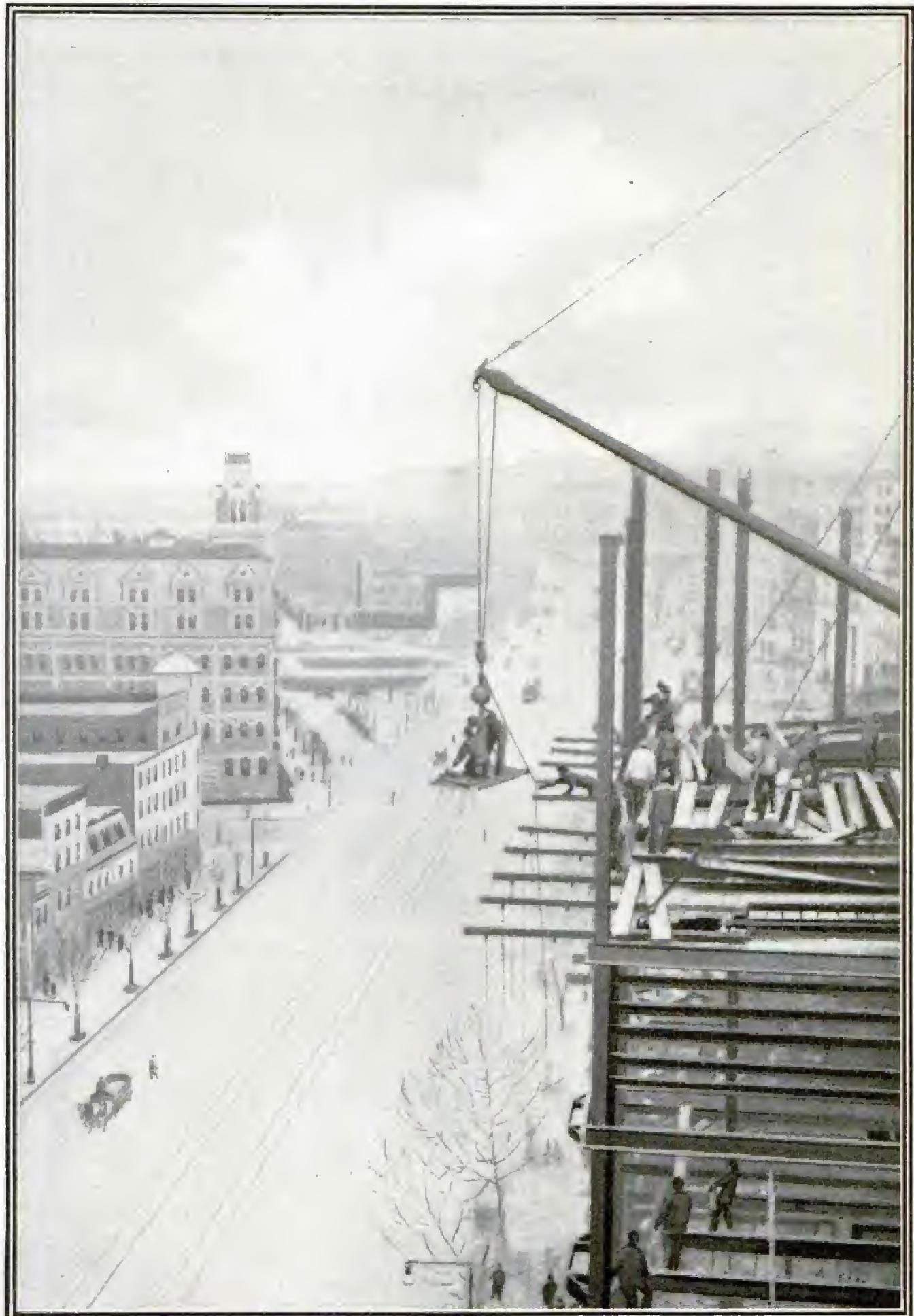
While the fatality among workmen engaged in the erection of the modern skyscrapers is surprisingly small when the hazardous nature of their occupation is considered, few big buildings are completed without claiming at least one human life. The men are, from the very nature of the business, inclined to grow careless and to take chances that those in other walks in life would not dream of and they are always expecting accidents. When they do happen, there is little fuss and feathers about them and the dead or injured man is gotten out of the way as soon as possible.

The other day, in Washington, an ironworker on a 13-story steel skeleton that was fast assuming the shape of a building was perched upon an upright column swinging a crosspiece into place. He had done the same thing hundreds of times before and to

him it was mere routine of a day's work. But this time there was a slip somewhere—just a little miscalculation perhaps—and down he went two stories, crushing his skull against the metal which stopped his body in its fall.

In a moment the men around him had secured a ladder and the unconscious man was tied, back down, along the rungs while the word passed down story by story to the street for the foreman to send in a call for an ambulance. Then the great crane, in obedience to a signal, swung over the ladder, the hook was made fast to the ropes attached to the ends of the improvised litter and all was ready for the downward shoot.

And just here came in that wonderful touch of nature which manifests itself so often in unexpected places. Two men stepped forward and took



Structural Steel Workers Risking Death Lowering an Injured Fellow Workman to the Ground Quickly on  
\* a Perilous Aerial Litter

their places on the ladder standing bolt upright, one at the fallen workman's head and one at his feet, and grasped the ropes. Not a word was spoken but everybody understood.

Two whistles, and the crane raised its load, swung slowly to the left, clear of the steel framework, and then the ladder and its burden started downward. Three stories down something caught; the ladder tipped perilously; the standing figures swayed and

sought to balance the load. Suddenly a man crawled out on a projecting beam, reached far over, shook free a rope that had caught and the ladder righted itself and continued on its downward course. The picture shows it all; the upturned feet of the wounded man and the figure on the cross beam reaching for the rope. It is a reproduction from a remarkable photograph taken by a man who happened to be on the roof of an adjoining building.



The Prisoners' Large Cage during the Trial of the Camorristi in Italy. Informer Occupies Smaller Cage

### THE TRIAL OF THE CAMORRISTI

The trial of the Camorristi, claimed by the Italian police to be the most powerful "black hand" society of modern times in Italy, has aroused extraordinary interest through all Europe and the United States. It is being held in the Church of the Scalzi, at Viterbo, which dates from 1675, and is now a court of assize. The accused, of whom there are 36, are placed in a great cage in the courtroom. The alleged member of the society, who, because the society had sentenced him to death, turned informer, occupies a smaller cage. It is interesting to note

that the cage in which the prisoners are confined while the trial progresses is over the tomb of Lorenzo da Viterbo, who was one of the great painting masters of the pre-Raphaelite period.

### ELECTRICITY IN WOOL SPINNING

In the spinning of wool, unless adequate precautions are taken, the yarn becomes electrified. As a result, the fibers diverge from it, part is torn off and goes to waste, the yarn becomes of uneven thickness, and frequent breakage and a general deterioration occur.

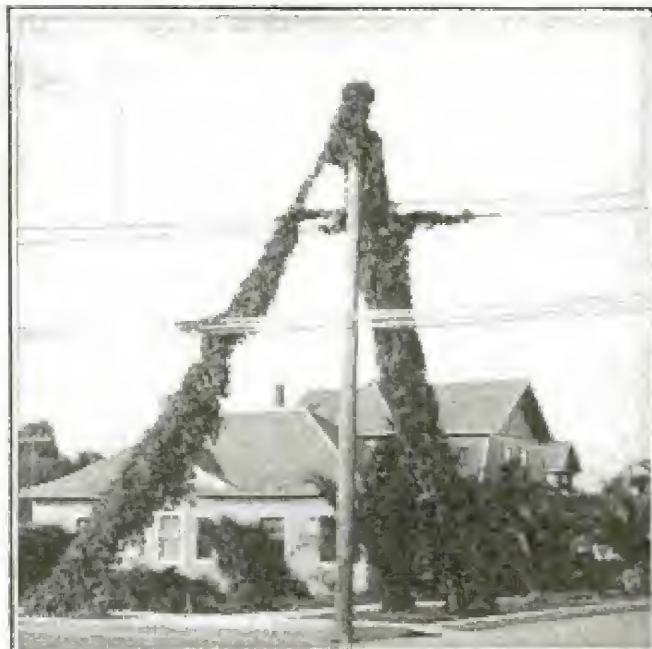
This electrification is prevented in

one of the great wool-spinneries of Fourmies, France, by means of high-frequency electrical currents, the system utilizing the Oudin resonator, aerial conductors and a series of pointed metal wires. The old method of prevention was to maintain a high degree of humidity in the workrooms, but, although this remedied the ill, the result was a high temperature and a lack of ventilation disastrous to the health of workers.

Since the installation of the new electrical system in the spinningry at Fourmies the windows are kept wide open, thorough ventilation is provided, the yarn made is more solid and elastic, and the waste and breakage are minimized.

### MORNING GLORY CLIMBS A TELEGRAPH POLE

Some years ago an expert of the department of Agriculture in Washington referred to a certain variety of morning glory seeds as a kind that the planter must drop into a deep hole quickly and then run away to avoid being tripped up by the vine in its growth. The perfection of a plant of this nature is reached in California and other places of equable climate, where



**California Morning-Glory Vine That Grew on an Unusual Trellis**

it grows in the utmost profusion, sometimes becoming a menace by the manner in which it entangles wires or shuts out light from a house, but more often adding beauty to the landscape and completing the ideal of the "vine covered cottage" of song and story. In Long Beach, California, there is one specimen of this vine that has grown along the guy wires of a telegraph pole in a mass several feet thick, making a very attractive festoon for a prosaic and otherwise undecorated pole.

### MEXICO BUILDING AN ALL-CONCRETE HARBOR

One of the most complete concrete harbors in the world is being constructed for the city of Manzanillo, on the west coast of Mexico. When finished, the harbor works will represent an expenditure of \$14,000,000 Mexican, or about \$7,000,000 in United States currency. About half of the work has been done. The improvements in progress consist of a long breakwater and a heavy sea wall. The breakwater section already built is 1,446 ft. long, 315 ft. wide at the base, 27 ft. wide at the crown, and 87 ft. high. Construction is now in progress on another section. A harbor of 165 acres will be inclosed, with an average depth, at mean tide, of 50 ft. Stone and con-

crete to the amount of 775,000 tons have already been used in the construction up to date. The foundations of the breakwater consist of blocks of stone weighing from 30 to 60 tons each. The sea face of the breakwater is capped with blocks of concrete, each weighing 30 tons, and the crown is a solid cap of concrete, 13 ft. high and 27 ft. wide, weighing about 60,000 tons.

Inside, the harbor is walled in along the shore with a facing of concrete 6,135 ft. long and 10 ft. high above mean tide. The outer slope is protected with a buttress of 15-ton granite blocks, the remainder of the construction being concrete. With the construction of this sea wall an area of



Model of the Harbor at Manzanillo, as It Will Appear When Completed

322,928 sq. ft., or nearly eight acres, has been reclaimed from the seashore, which will be utilized for the construction of warehouses, etc. In connection with the work there has been 640,920 cu. yd. of sand and soft material dredged from the harbor together with 71,490 cu. yd. of stone and hard material. In the construction of the workshops, etc., 5,000,000 ft. of lumber was used, and 37,000 bbl. of cement were necessary for the con-

struction of that section of the work that has been completed. The wharves and docks, it is proposed to build, will be 15,466 ft. long and will accommodate 50 vessels at one time. The imports of Manzanillo, according to the latest figures obtainable, amount to \$582,573.47, leading all the other Pacific coast ports in Mexico by many thousands of dollars. Six steamship lines make the town a regular port of call.

## INSIGNIA FOR THE OFFICE OF PRESIDENT

The Israelites of old cried for a king, American heiresses continue to seek foreign titles, and now the president of our sister republic of Brazil has been endowed with a special badge of office—all of which goes to show that human nature still has a leaning toward the "boast of heraldry, the pomp of power." The Brazilian president will in future wear a band of ribbon, 6 in. wide, terminating at its ends in gold fringe. On it will be embroidered in gold the heraldic arms of Brazil, over a ground

of the national colors. Suspended from the ribbon will be a gold medal showing on one side the Brazilian coat of arms, and on the obverse side the inscription "Presidencia da Republica do Brazil."

According to advices from Nottingham, England, the reduction of \$1,629,696 in the business of the lace factories of that section is directly attributed to the discarding of the petticoat by women who now wear hobble skirts or styles of garments designed to cling close to the figure.

# FIRST RAILROAD TO WORLD'S DENSEST TIMBER BELT

By H. M. WRIGHT

BY the latter part of 1912 a new railroad line, owned jointly by the Southern Pacific and Santa Fe railroads, will have been completed between San Francisco Bay and Eureka, Cal., and will tap the giant redwood belt on the north coast of California, which contains some of the densest stands, acre for acre, of commercial timber in the world.

The redwood forests, which comprise the only extensive stretches of redwood in the world outside of 2,000 acres in Southern Oregon, extend from Northern Sonoma County, Cal., to the Oregon line,—a distance of about 230 miles. The belt varies in width from 10 to 45 miles, and lies in the foggy

region between the Pacific Ocean and the Coast Range.

Much of the country wherein the redwoods grow is peculiarly rugged and precipitous, and the new line, known as the Northwestern Pacific, will throw open to exploitation forests which, according to estimates of government officials, will yield at least 45,000,-000,000 ft. of sawn redwood. This estimate does not include millions and millions of feet hidden away in remote cañons, which will not be cut for generations to come.

The redwood, which is a huge cypress-like tree, is one of the largest, tallest, and oldest trees in the world. The product of a single giant redwood



Felling a Redwood. The Tree is Cut Until the V-Shaped Niche Almost Reaches the Line That Has Been Sawed Through; Then a Wedge is Placed in the Sawed Part; It is Driven in and the Tree Topples Over

has been as much as 166,000 ft. board measure,—enough lumber to build ten ordinary-sized eight-room houses. When it is considered that 20,000 ft. of lumber is a good yield per acre for pine forests, some of the unusual features of redwood lumbering may be inferred.

The new line will give the first railroad connection between the timber belt and the outside world. Trains are already operating on a part of the system. What remains to be completed is a 105-mile gap between Shively, a lumbering camp 15 miles south of Eureka, and Willits, 137 miles north of San Francisco.

Orders have been given the contractors to rush the construction; within a year the line will have penetrated the heart of the vast redwood belt, and the whistles and bells of the locomotives will echo for miles in the redwood forests, where every sound seems magnified a thousand times. Six thousand men will be employed on the construction during the summer of 1911. The engineering task is a difficult one, but the world needs lumber.

Although the annual cut of redwood is about 350,000,000 ft., the demand for the wood is gradually spreading from the Pacific coast to foreign countries, and it is only a matter of time when the present facilities for marketing the redwood forests would have proved inadequate. In Humboldt County, the center of the redwood industry, about 5,000 men are employed in various phases of redwood logging and manufacture. In Mendocino, Del Norte and Sonoma Counties, the number is probably less, for there are vast stretches of redwood forests which have seldom been penetrated by any white man, except government experts and timber cruisers in the employ of big lumber firms. In Humboldt County there are 11 great sawmills, some of them among the largest in the world. And there are more than 40 shingle mills that turn out over 700,000,000 shingles annually. Redwood shingles are made from the branches of the trees which are larger than ordinary pines.

Redwood itself is a most valuable commercial wood. It is almost unburnable. It comes in great sizes. It is easily sawed and worked, and when polished and made up into furniture, takes on a luster like mahogany.

So far as the present generations are concerned, the redwood forests are practically inexhaustible. Originally, it is estimated, they covered 538,000 acres. At least 62,000 acres have been cut within the past 60 years, thus leaving 476,000 acres still standing. Based on an estimate of 100,000 ft. of merchantable lumber per acre, there is an uncut reserve of 47,600,000,000 ft. of redwood. But this is probably an underestimate because in the first-growth forests many single trees will run 100,000 ft.

Visitors to California usually confuse the redwoods with the "Big Trees." The trees are cousins, being the only two known species of the genus *Sequoia*, but they inhabit different localities.

Logging the redwoods is more than a one-man job. It takes at least three expert cutters to fell a big tree. Because of the vast weight of the forest giants a bed of underbrush must be prepared before the tree is felled. This prevents the breaking of any branches. When the bed is made, the cutters build a platform around the trunk and several feet above the ground. On the opposite side from which the tree is to fall the trunk is sawed through almost to the center. This is the cross cut. A wedge is then cut in with axes on the side on which the tree will fall; this is the undercut. When the wedge passes the center of gravity the tree topples over with a noise that can be heard for miles.

After the tree has fallen, the branches are sawed off and then "ringers" and "peelers," with axes and crowbars, tackle the trunk. The bark is first ringed or sawed off, every 12 or 14 ft., and is then pried from the wood with crowbars. All this work leaves an immense amount of debris in a redwood timber cutting. With all this rubbish surrounding the trunk the loggers are



Hewing the Right of Way for the New Line through the Vast California Redwood Belt

unable to handle the tree at all so they choose a quiet day in which there is no wind and set fire to the mass. Owing to the fact that redwood does not burn readily, the wooden sections of the trunk are hardly more than scarred.

When the ground has been cleared by fire, donkey engines operating through blocks and tackle furnish the power to drag these huge logs over skidways to the railroad track. Special apparatus has been devised to handle redwood timber and the work of the loggers in the most precipitous country is really wonderful. Many of the logs are twice or even three times the height of an ordinary man as they lie upon the ground.

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The available supply of the nitrate fields of northern Chile has been recently computed to be 245,827,000 tons, or sufficient to supply the world's needs for 50 years.



A Typical Big Tree, the Grizzly Giant, at Maricopa, Cal. The Big Tree, *Sequoia Gigantea*, is the First Cousin of the Redwood, *Sequoia Sempervirens*



L'Aero, Paris  
"WHAT KIND OF A PLAGUE OF GRASSHOPPERS IS THIS?"

A Paris paper proposes a race from Marseilles to Algeria as the great all-French aviation event of the year. The above is a French artist's idea of the reception the aeroplanes would receive in Africa after their flight across the Mediterranean.

#### IRRIGATE 1,000,000 ACRES IN WASHINGTON

Work will begin this spring on irrigation projects covering more than 1,000,000 acres of land in eastern and central Washington. The total cost is estimated at \$55,000,000, provided by private capital. This is exclusive of the federal government's projects in central Washington.

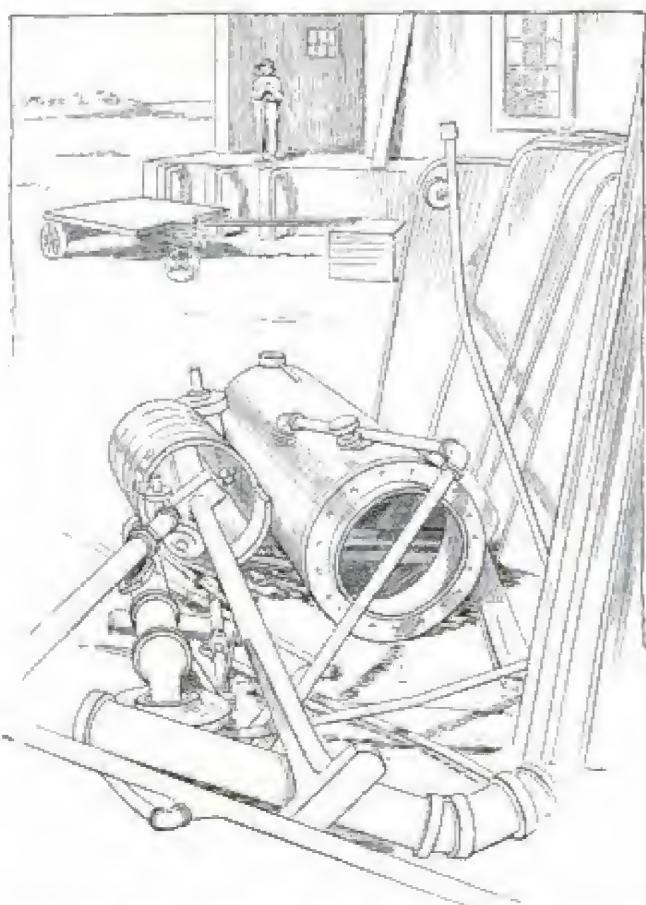
Most of the irrigation plants to be installed will be in the Quincy Valley project, 100 miles west of Spokane, where 500,000 acres of land will be reclaimed. The cost of watering the tract, which is owned by ranchers, is estimated at \$25,000,000.

No less than 300,000 acres in south central Washington are included in the Horse Heaven project. This work alone will cost in the neighborhood of

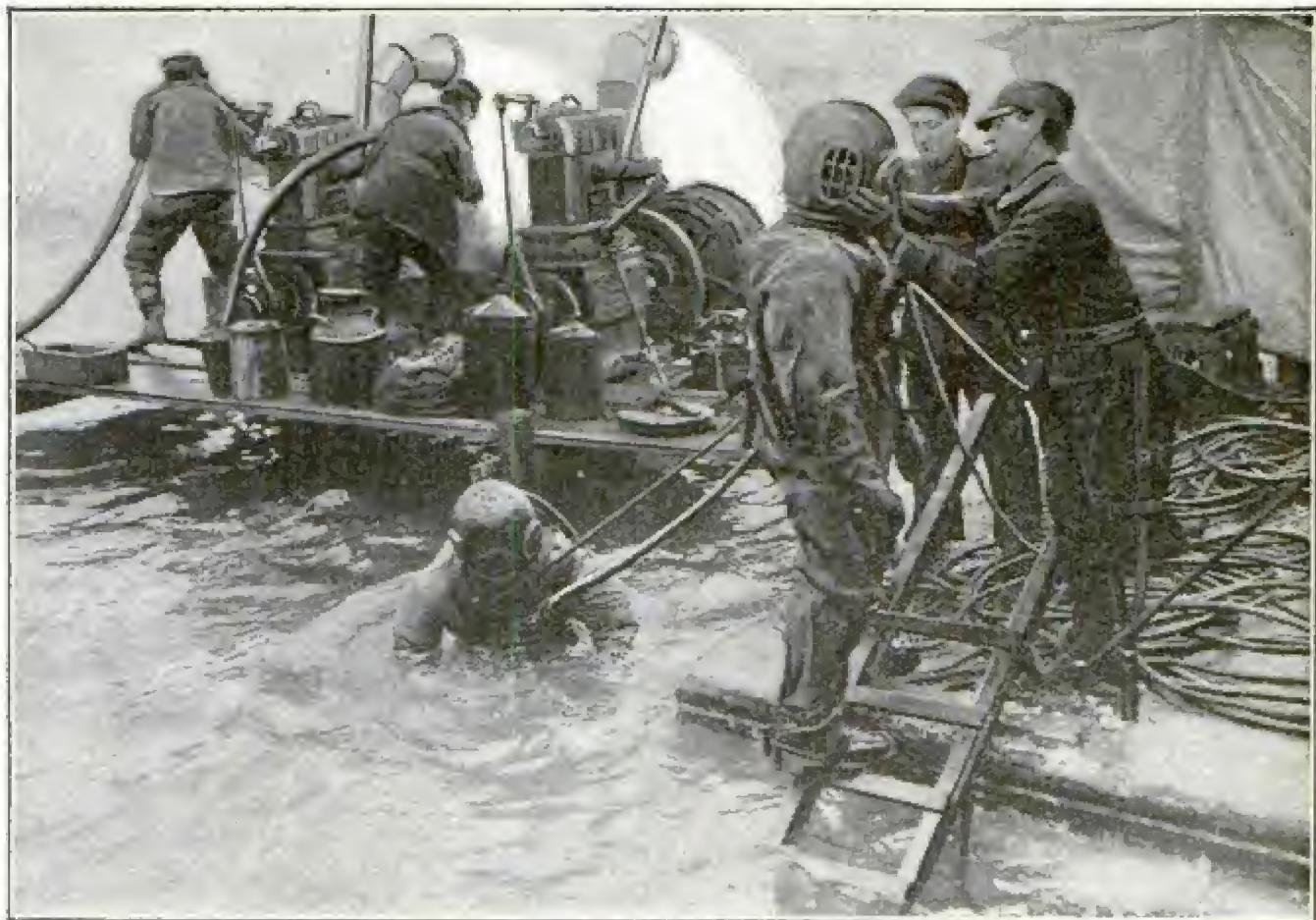
\$12,000,000. Water rights are being sold to farmers, who own the land, at a rate of \$60 an acre, payable in 15 annual installments. A reservoir will be built to store the water, which will be delivered to the land in cement-lined canals. The plan also contemplates the development of 40,000 horsepower in electrical energy, to be used in pumping additional water from the Columbia River.

#### GAS ENGINE BLOWS ITSELF THROUGH BUILDING

After this engine had been running about 10 years, its bedplate cracked at the top where the cylinder was bolted on. A strap of iron was put on, but the bolts holding the cylinder continually worked loose, and could not be made permanently tight. As a result, the cylinder, which weighed about 800 lb. and was fastened to the bedplate by ten 1-in. cap screws, at last broke loose with explosive violence, tore its way through the door of the engine room, and landed 20 ft. away.



Cylinder and Piston of Gas Engine Blown Out of Engine Room



At Work in the Unsuccessful Attempt to Raise the Str. "W. C. Richardson," the Twin Pumps Emptying the Hull on the Left

## SALVING THE STEAMER "RICHARDSON"

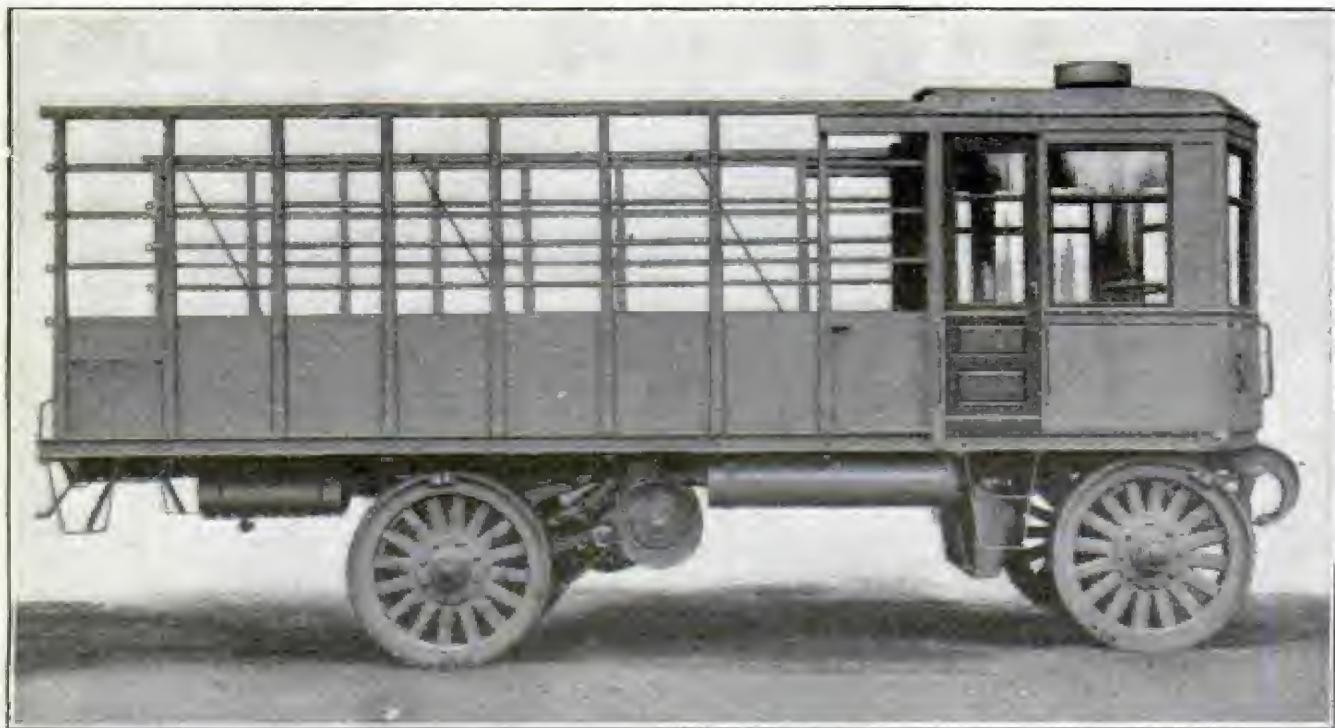
The foundering of the steamer "W. C. Richardson" just outside the breakwater of the Buffalo Harbor during one of the terrific gales that swept the Great Lakes in December, 1909, was more or less of a mystery to marine men, and it has been a mystery ever since. The first attempt to raise her proved futile, a second also failed. In the spring of 1910 a third attempt was made, and this likewise failed, the

steel covers made for the hatches being swept overboard by the seas. A fourth attempt has met with but little more reward. When success seemed about to crown this effort, the decks fell in under the weight of the ice and the seas, and holes, somewhat difficult to explain, were found in the hull. Again the work started, then a hurricane swept the ice onto the hulk again and carried everything before it.

## GIANT AUTO TRUCKS TO HAUL 35 TONS

Arizona is about to be the scene of operations of two of the largest motor vehicles in the country which the owners term "auto freight wagons." The distinctive feature of the wagons, in addition to their tremendous size, lies in the fact that they are driven by electric current generated on the machine itself by a 90-hp. gasoline en-

gine. The trucks are 25 ft. long and 10 ft. wide and are capable of transporting a load of 20 tons at the rate of six miles per hour over almost any kind of country. The wheels have steel tires, 12 in. broad. The outer edges of the tires are smooth, but the central portion, extending about two-thirds the width of the tire, consists of



Twenty-Ton Gasoline Truck for Hauling Ore and Mining Supplies over Desert and Mountain Trails

corrugations which the builders claim make it possible to secure traction on any kind of road or even in places where there are no roads.

The gasoline engine is placed forward in a species of cab, walled off from the remainder of the truck. The engine is connected by a shaft to a 125-volt electric generator, from which the power is supplied to the rear wheel. There is a  $7\frac{1}{2}$ -hp. motor for each of the rear wheels, either of which is capable of driving the car when fully loaded. The use of electric current in place of gasoline is to obtain greater flexibility of power. The motors are connected with the wheels by chain drive. The motor-man-engineer is provided with a controller similar to that on a trolley car, in front of which is placed the steering apparatus consisting of a tiller wheel of the same style as that used on an automobile. Practically all of the machinery is in the cab, which is about 4 ft. deep and extends the width of the car.

The trucks are built of steel throughout, except the floor and the cab. The frame was especially made for the purpose and is very heavy. The trucks are to be put into service at Kingsman, Arizona, over a road 85

miles long, to carry supplies from the railroad to a mining camp and haul ore from the camp to the railroad. The capacity of the trucks is 20 tons and in addition to this they are each equipped with coupling devices that will enable them to haul trailers carrying 15 tons more.

#### TO PREDICT EARTHQUAKES

With a view to obtaining data from which impending earthquakes of volcanic character may reasonably be predicted, and to make observations on ore formation within spheres of volcanic influence, several Italian scientists, under the leadership of Signor Immanuel Friedlaender, of Naples, are endeavoring to establish an international volcanological institute at Mount Vesuvius. Although an observatory has existed for some time past on Vesuvius, it is said that systematic investigation such as planned for the new institute has never yet been attempted, in any place in the world. A building and equipment fund of \$300,000, and a yearly income of at least \$10,000, are requisite for the foundation. It is aimed to secure these by the first of January, 1912.

## SCIENCE AND MECHANICS IN THE MIDDLE AGES



No. 6—AN OLIVE-OIL MILL.—The olive has been cultivated in Syria, Palestine, and other parts of the East since the earliest times. Its cultivation extends as far south as Cairo, and north to the middle of France. In the illustration is shown a sixteenth-century olive mill of southern Europe in activity. The grinding mill is worked by an ox and the press by men.

## OLD FERRY BOAT USED AS A CLUBHOUSE

An ingenious use has been made of an abandoned ferry boat in San Diego Bay. It was bought for a song, hauled up in shallow water and securely an-

chored by piles driven all around it. A trestle was built connecting the boat with the shore, and the whole interior, after being stripped of its machinery,



Old Ferry Boat Now Used as a Pleasure Pier at San Diego, Cal.

was rebuilt as a dancing pavilion, promenade, kitchen, dining room and in fact all that goes to make up a pleasure resort. It is the property of a yacht club in San Diego and forms one of the interesting landmarks of that beautiful harbor.

The two pilot houses form observation towers, and the old ferry boat, in its coat of glistening white paint, makes very appropriate quarters for the club.

The old "Benicia" which formerly

## COUNT ZEPPELIN RENEWS DIRIGIBLE FLIGHTS

Undaunted by the disasters that have overtaken his previous ventures in the field of aerial navigation, Count Zeppelin has begun a season's work with dirigible balloons, the first of his new fleet having made an eight-hour journey between Friederichshafen and Baden-Baden by way of Stuttgart. The new "Deutschland" is a powerful airship and on the first trip Count Zep-



Type of the New Zeppelin Dirigible "Deutschland" Which Made Its Initial Voyage in Germany Recently

traveled back and forth in San Francisco Bay was brought down to San Diego to serve as a ferry boat between that city and Coronado, but the distance is so short between these points that the powerful machinery would hardly get started before it was necessary to stop it and the huge boat was as unwieldy as a whale in an aquarium. For that reason it was abandoned for a long time and would have rotted away if some enterprising club members had not hit upon the idea of utilizing it as described.

pelin carried 10 passengers. The German scientist has not yet made public all his plans for the summer season, but the presumption is that he will continue his efforts to establish a regular passenger-carrying dirigible service in Germany.

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Experts in shop efficiency and scientific management regard the distribution of labor in the big-gun practice of the United States navy to be one of the finest exemplifications of their creed to be found in the world today.

## NAVAL CRANE LIFTS ITS OWN 216-TON TRUSS

The great floating crane "Hercules" of the New York Navy Yard in Brooklyn, now reconstructed and more powerful than before, broke all lifting records recently by lifting her own steel trolley truss into position at the top of the uprights or legs. The trolley truss is 200 ft. long and weighs 216 tons.

Two weeks of preparation were required before the lifting feat was attempted. A test lift of a few feet was made with 70 tons of steel piled upon the truss, as a means of making certain that the capacity of the apparatus was sufficient. The lifting was accomplished by means of steel hoisting cables, working over eight steel pulley blocks, each of which weighed a ton and was especially constructed for the purpose. The power was supplied by the Hercules' own engines. The huge steel truss was held suspended about 45 minutes, rising smoothly and steadily. Steel pins, 8 in. in diameter, were used to fasten the truss in place.

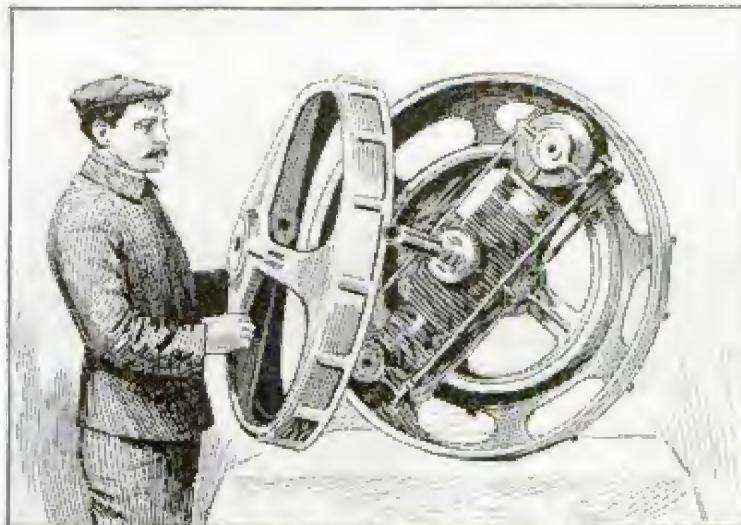


The "Hercules" Raising Her Own 216-Ton Truss into Place

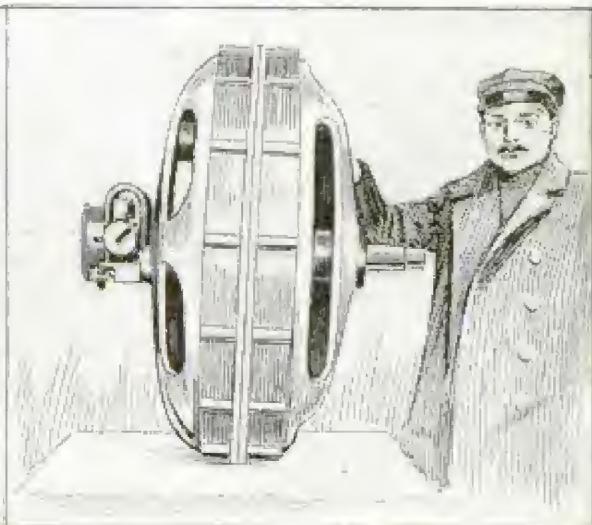
## ONE-CYLINDER ENGINE FOR AEROPLANES

An interesting type of "rotary" aeroplane engine, invented by two French engineers, develops 75 hp. and weighs

only 165 lb. (1 hp. for  $2\frac{1}{5}$  lb. of weight), although it has only one cylinder. Its special feature is the method



Engine with Part of Housing Removed



Single-Cylinder "Rotary" Engine

of gearing down an engine speed of 4,000 revolutions a minute to a propeller speed of 500 revolutions.

The propeller shaft is bolted transversely to the middle of the cylinder and rotates with it. In the middle of this cylinder is the combustion chamber from which two pistons work in opposite directions to rotate, by their connecting rods and cranks, a pair of small gears or pinions, there being one pinion outside of each crankcase at either end of the cylinder. These pinions run

around on a large stationary gear wheel, concentrically arranged with regard to the cylinder, thus forming a "sun and planet" gear. The proportions of the pinions and large gear wheel determine the speed reduction, which is chosen in this case as 8 to 1. The pinions carry around the cylinder, and therefore the propeller shaft, at the reduced speed made possible by the gearing arrangement. The whole is enclosed in a stationary aluminum housing.



Machine that is Relieving the Filipinos of the Laborious Work of Stripping Hemp Fiber

## MACHINE REPLACES HANDS FOR STRIPPING HEMP

By MONROE WOOLLEY

The world's hemp supply, unlike Manila paper, comes from the Philippines. Until a few years ago all hemp produced in the islands was stripped from the stocks of the plant from which it is taken by hand, a slow, tedious, and wasteful process. When Americans first landed, one of the first things to attract the attention of the commercially inclined was the need of a machine to harvest hemp. Soldiers, government officials, merchants, and school teachers set themselves to the task of inventing one, dreams of wealth and fame urging them on. For ten years they struggled with their schemes but

it was not until as late as 1907 that a machine of real worth was given a trial in Manila. Shortly after, two or three others of value appeared, and were given public tests in town and in the field, all coming off with more or less honors.

The most successful of these, which is driven by steam or electricity, does the work of a small army of native Filipino strippers, does it quicker, and turns out a much superior grade of hemp than that obtained by the hand method.

Hemp is produced from a fibrous plant much resembling the banana

plant. The long strands of fiber which look like golden threads, and which we see every day worked up into rope, are stripped from the trunk of the plant. These trunks, when the outer leaves are trimmed away, greatly resemble over-grown stocks of celery, as will be noted from the stack of the raw product standing just back of the stripping machine in the illustration. Formerly the natives stripped the strands from it by means of a toothed knife, similar to a saw or comb, which they raked over the pithy substance.

The hemp-stripping machines do away with all the faults and flaws. Most of the machines have a set of teeth which revolves and starts the strands from the stock. Later, a system of cylindrical brushes made of wire, complete the operation of separating all the pulp from the strands, leaving the latter clean, even, and of a uniform length. The pulp and waste is carried by belt conveyors to refuse piles, from which it is hauled away to be worked up into merchantable by-products. Hemp-stripping machines as perfected by most of the American inventors are made in two or three sizes. One size is adapted to hand operation, another is a portable power plant.

### METALLIZED PAPER

Metallized paper is being manufactured by a German process as a substitute for tinfoil. Ordinary paper is treated with a mixture of finely powdered metal and resin and then subjected to friction, with the result that it becomes as flexible, brilliant and impermeable as sheets of tinfoil. Wax or an alcohol solution of gum lac may be used instead of the resin.

In making the tinfoil paper, either pure tin in a powdered state may be used, or a mixture of aluminum powder and tin. The final polishing is done by calendering, which, hitherto always done with heated rollers, is accomplished in this process by means of refrigerated rollers.

### SCARECROW PROTECTS SUNSHINE RECORDER

The erection of scarecrows as a means of protecting fruit or grain from birds is very common, but this is one

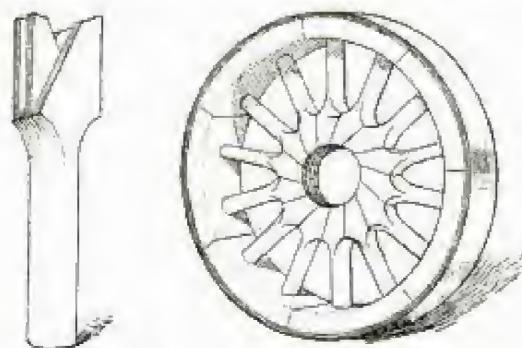


Scarecrow Protects Sunshine-Recording Apparatus from the Curiosity of Seagulls

of the first instances recorded in which such a means has been adopted to protect an object not edible. The scarecrow in question is placed beside the sunshine-recording apparatus at Ventnor, Isle of Wight, the working of which had been interfered with by curious seagulls.

### WHEEL FOR MOTOR TRUCKS

In this wheel for heavy motor trucks, the spokes at the hub end are grooved and mortised so as to interlock, forming what is claimed to be an absolutely

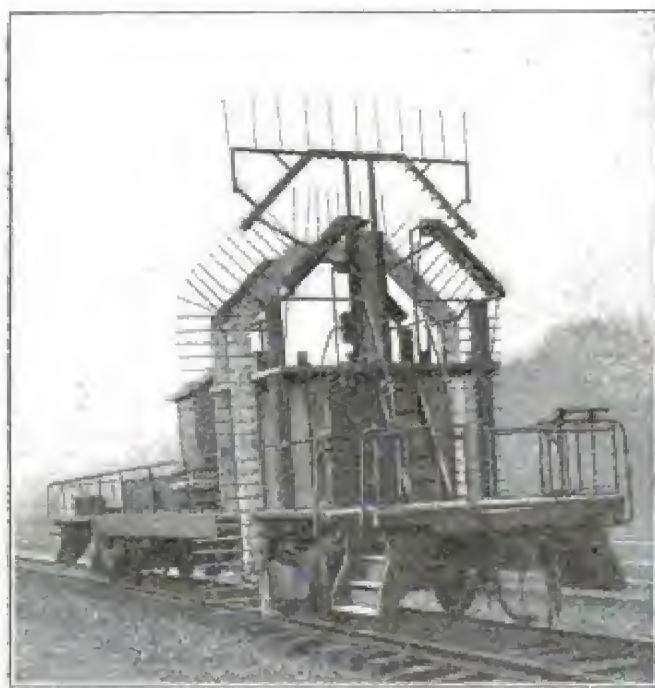


Interlocking Spoke, and Truck Wheel Made of Such Spokes

compact, immovable assemblage that cannot loosen under the most severe strain. This design is intended to give a positive and evenly distributed spoke support, thus reducing to a minimum the chances of breakage.

### CLEARANCE CAR OF THE PENNSYLVANIA SYSTEM

The new clearance car of the Pennsylvania Railroad lines, now being run as rapidly as possible over every division east of Pittsburg and Erie, in order



**Clearance Car of Pennsylvania Railroad, Showing Stationary and Auxiliary Templets**

to secure measurements of the distances from the tracks to projecting portions of station buildings, tunnels, bridges and other objects, is equipped with ingenious automatic mechanisms. The clearance measurements are made by means of templets, one of which is an auxiliary templet for overhead measurements. The car is also designed to indicate automatically the elevation and degree of curvature of the rails while running over curves.

All measurements are taken at the center of the wheel truck, from which clearances are computed. The main templet, which is erected directly over the center of the truck, has a width of 10 ft., and rises to a height of about 12 ft. above the top of the rail. In front of the main templet is an auxiliary templet, designed to measure overhead bridges, tunnels and other objects whose elevation is from 17 to 20 ft. above the top of rail. Attached to the sides and tops of the templets are fingers or feelers, 2 ft. long, spaced 6

in. apart. They are hinged to the templets and held in the different positions by friction. Attached to the feelers and the side of the templet are graduated scales which automatically indicate the distance from the rim of the templet to the side or overhead object touched by the feelers.

The attachments for measuring the track elevation and degree of curvature of curves consist of a device on the rear truck, the recorder of which is in a cabinet erected in the middle of the car, and a vertically suspended pendulum, likewise within the cabinet.

As all the attachments work automatically, it is possible to take all the measurements while running at a speed of four miles per hour.

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### REINFORCED MACADAM PAVEMENTS

Many experiments are being made in Europe in the hope of finding a comparatively inexpensive type of paving that will withstand the destructive action of automobile traffic. Trials have lately been made in France with a so-called reinforced macadam, the idea of a road superintendent in the department of Vendee. The bottom layer of this pavement is concrete, the middle layer is of cement mortar reinforced with iron rods, and the top layer is crushed stone and mortar.

This road surface is said to be much more elastic and durable than ordinary macadam, and in cost does not exceed that of brick paving in France.

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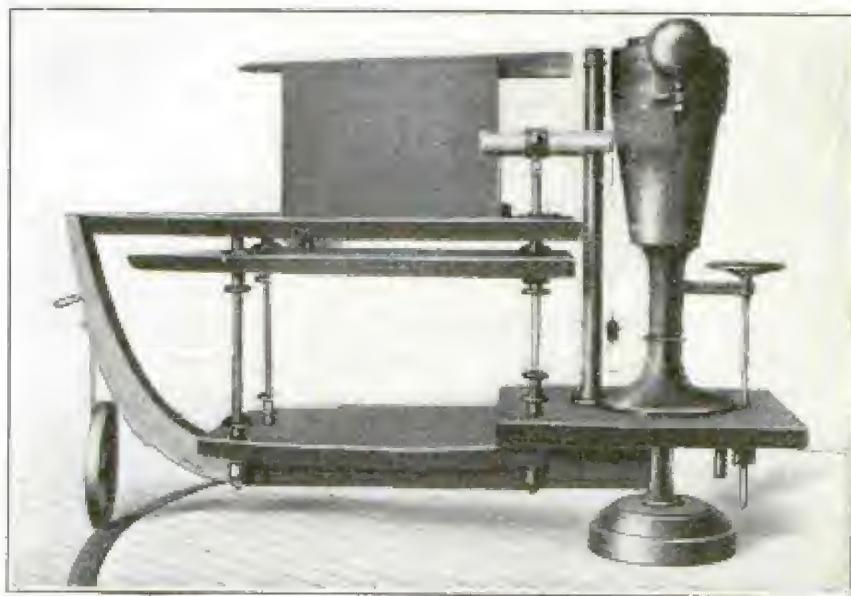
The withdrawal of France from the international distance aeroplane flights planned in Continental Europe is believed to have been caused partly by a feeling of resentment over the statement made in the Reichstag at Berlin that implied Germany was in the lead in aeronautics and aviation. The flights in question were to take place between German, French, and Belgian cities but will now be held wholly within the boundaries of Germany.

## MAGNETIC SHIP ON WHEELS

The Naval Observatory at Washington has recently installed a machine by which the magnetic effect of the steel and iron parts of a ship upon the ship's compass can be measured. The same force that turns the compass needle north and south also magnetizes the iron and steel of the ship. This magnetism naturally influences the compass needle, and must be compensated for if the ship is to be steered correctly.

The machine at Washington represents the bow of the vessel and has a full-sized compass on board of it. The whole can be placed in one room. It is set up on a circular track so that the bow may be directed to all points of the compass. A horizontal steel plate on top represents the soft steel of the ship, the magnetism of which changes with the direction of the vessel. The hard steel of the ship, which is permanently magnetized by the earth's influence when

the vessel is building, is represented by bars laid across the plate at right angles. Small bar magnets can be inserted beneath the compass to correct deviations, and this correction is further aided by two big balls of iron placed one on each side of the compass. Various adjustments are made



The Magnetic "Ship"

as the machine is rotated, so that finally the compass registers correctly in any position, just as if it were placed on an actual vessel afloat on the ocean.

## DISEASE MIXES SOUNDS AND COLORS

Physicians now recognize a condition which probably accounts for the hallucinations and delusions of the insane. It is called synesthesia, and those afflicted with it are known as synesthetes. It is that peculiar condition in which sounds create the idea of colors, and vice versa, or in which colors, tastes, sounds, and odors are confused.

"Synesthesia is not a matter of much practical importance," says American Medicine, "but it is highly interesting, to say the least. It is that curious phenomenon of the overflow of sensations so that air waves for instance, give a sensation of color as well as sound. It

seems that through some defect of development the cortical centers (of the brain) are not insulated from each other completely, so that a stimulus received from the retina, say, is not confined to the visual centers, but affects adjoining ganglia.

"The commonest form is colored hearing, and most of the cases of synesthesia investigated up to a few years ago were of this type. No two were alike, that is, the same sound would cause different colors or shadings in the different cases; a locomotive whistle would be yellow to one, or white to another, and so on.

"Moreover, in some cases only a few sounds are colored, such as the

tones of a piano from black in the bass to white in the upper keys, with a spectrum in between. In other cases every sound has a light sensation added to it. Then there are cases in which colors or odors give sound sensations—glaring colors being loud, literally as well as figuratively, and, of course, there must be an infinite variety of mixtures of the other sensations.

"The most distressing cases are those in which there is an actual confusion of sensations, so that odors and tastes and sounds are not differentiated. No doubt these abnormalities are at the basis of many delusions and hallucinations of the insane.

"The nervous instability of synesthesia is the practical side of this subject. Without an exception, the cases present evidences indicating considerable nervous involvement, in the way

of abnormal development. Some, if not most of them are highly intelligent, though incapable of that hard work necessary for success, and all are very sensitive to irritations which the average man ignores.

"Perhaps the condition is far more common than we imagine, and it would be well to keep it in mind in the treatment of neurasthenics. We might find that they are great sufferers from jarring sensations, not in the way usually thought of, but in these overflows to other centers.

"A normal woman may be made actually ill by garish colors or coarsely arranged music, and we all know the bad effects of certain tastes and odors; how much more suffering there must be in synesthesias where the irritant affects more than one center."

## MOTOR STREET CLEANER ABSORBS THE DEBRIS

Instead of sweeping the debris to the curbing, where it would later have to be shoveled into piles and carted away, this motor-driven street-cleaning machine collects and carries it to the dump, where it is disposed of.

Its essential parts are a motor-driven truck, a rotary broom, a belt-conveying device, and a large dust and dirt compartment mounted on the rear end of the truck. A 40-hp. engine supplies the power for propelling the machine and operating the broom and conveyor. Two men are required to operate it, a driver on the front end, and an attendant to control the sweeping operations.

It is claimed that with this machine, streets can be thoroughly and rapidly cleaned without water and without causing dust, permitting cleaning during the

winter months when water cannot be used. The suction or vacuum principle is not involved, the debris simply being swept up on the conveyor by the rotary broom, and carried into the dust compartment of the machine.



This Street-Cleaning Machine Sweeps Up the Debris, Conveys It into a Dust Compartment and Carries It to the Dump

This machine is being thoroughly tested out by the New York street-cleaning department.

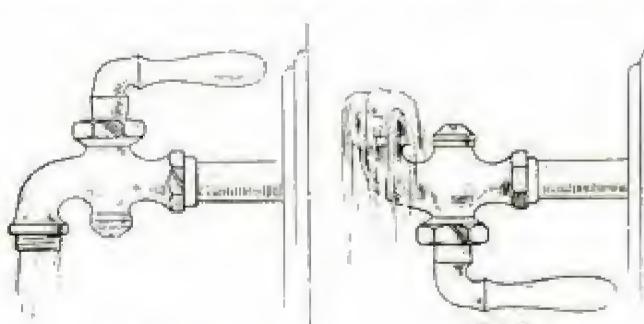


### How to Kill Dandelions

An easy way to kill dandelions in lawns is to apply kerosene to the roots of the plant. Cut the root about 1 in. below the surface and apply a few drops of the oil before the earth is pressed in place. The plant will not grow from a root treated in this manner.—Contributed by Charles W. Cooper, Oakland, Cal.

### A Sanitary Drinking Fountain

The illustration shows a simple method which I have used for some time as a sanitary drinking fountain.



Faucet Turned Over

In most shops no cup or glass is kept for drinking purposes. If the ordinary faucet (Fig. 1) is turned half way round, as in Fig. 2, it makes a sanitary fountain such as found in parks. When through drinking, the faucet can be turned to its original position.—Contributed by Walter C. Heidt, Chicago.

### Felling Trees by Fire

A method of felling spruce trees by fire is shown in the sketch. A hole is bored horizontally into the trunk of the tree for about 1 ft. and another hole bored at an angle to meet the first one

(Fig. 1). Hot coals are placed at the intersection of the holes so as to ignite

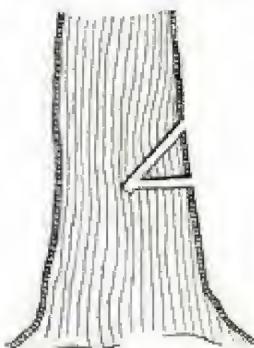


FIG. 1

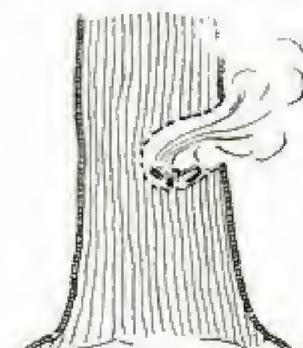


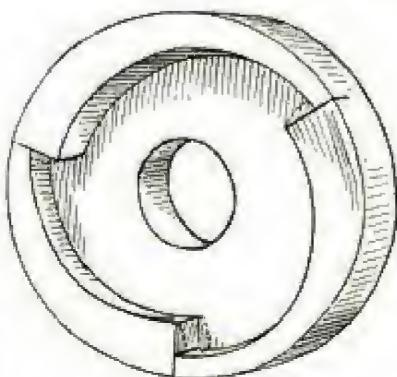
FIG. 2

Firing a Tree

the pitch running from the pores. The draft will cause a rapid combustion and in a short time the tree will be burned through, causing it to fall toward the burning side.—Contributed by A. J. Staver, Portland, Oregon.

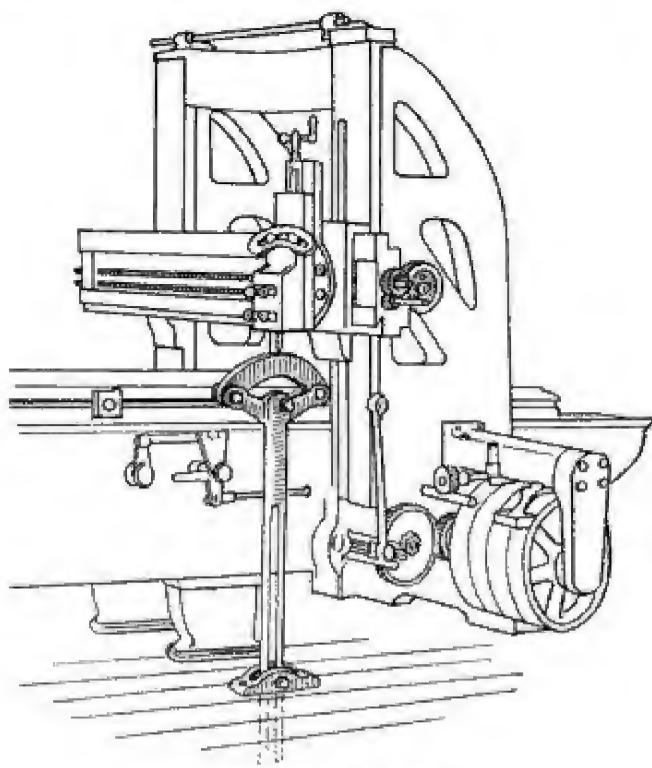
### Repairing a Lawn-Mower Ratchet

A worn driving-pin or shoulder of the ratchet on a lawn-mower will cause the wheel to slip at times instead of driving. A longer pin will rectify one defect, but if the shoulder is rounded, it can be remedied by cutting through the casting with a hacksaw so as to make a new straight shoulder. The heavy line shows the saw cut and the dotted line the part removed.—Contributed by Frank S. Henry, Haddon Heights, New Jersey.



### Cutting Arcs on a Metal Planer

Quadrants may be machined to any arc of a circle on an ordinary metal planer by using the attachment shown



Rocker on Planer

in the illustration. The device rocks on a bolt for an axis. This is set in the tee slot on the side of the planer bed. The rocking motion is caused by a slotted arm that passes through a metal block on the floor. This block is fitted with a pin to slide in the slot of the arm.

If the arm is slotted at both ends, it will provide an adjustment for cutting various sized quadrants.—Contributed by Carmi L. King, Concord, New Hampshire.

### Cleaning Gas Mantles

Because of the imperfect combustion of the carbon in the modern gas lighting jet, when a mantle is used, the part enclosed usually collects a deposit of carbon which shortens the life of the fixture and gives to the mantle a smoky appearance.

The carbon can be removed and the mantle cleaned by sodium chloride, better known in household circles as salt. It may be gently sprinkled on

the burner or in it, if possible, while the gas is burning. The salt unites with the carbon, leaving the gas burner and mantle clear of it, and coated with a substance that will not allow carbon to deposit on the burner or mantle for some time. The application of the salt is perfectly harmless and no injury can result to the fixture.

A large quantity of salt is not needed. The same material can be used in cleaning gas stove burners and gas irons which collect carbon deposit inside while being used.—Contributed by Loren Ward, Des Moines, Iowa.

### Holding a Door Open

A clip that will hold a door open and work almost automatically is shown in Fig. 1. It is made of a piece of strap iron 1 in.

wide and about 6 in. long. Both ends are turned up as shown and a hole drilled in the center for a screw. When set in the position

shown in Fig. 1, the movement of the door will cause the clip to turn over the end as in Fig. 2. In closing the door the clip is turned with the foot.—Contributed by J. C. Judkins, W. Medford, Mass.

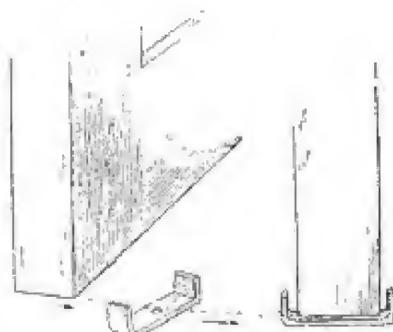


Fig. 1

Fig. 2

### Renewing an Old Brush

Anyone who has used a common brush for any length of time finds that the point end will wear faster than the



Reversing Brush Handle

heel and the brush becomes tapering as shown. If one is inclined to economize in such matters, it is possible to

get nearly double the wear out of a brush by squaring the worn end, sawing off the handle and fastening to the opposite end as shown by the dotted lines in the sketch. The wear will then come on the unused part.—Contributed by C. S. Bourne, Lowell, Mass.

### Space Economy in a Lumber Yard

A western lumber man, who has a limited space in the city for piling his stock, has hit upon an ingenious way of stacking lumber so that it can be within reach and take up very little room. A strong rack of 6 by 6-in. material was built and the lumber was up-ended against this, care being taken to balance the stacks on each side so that the support will not be forced out of plumb. In this way the owner was able to carry a great variety of lengths and sizes which would otherwise require many times the ground space, and in addition to that, he could pick out any particular piece he required with less trouble than it could be sorted from an ordinary flat pile.—Contributed by C. L. Edholm, Los Angeles, California.

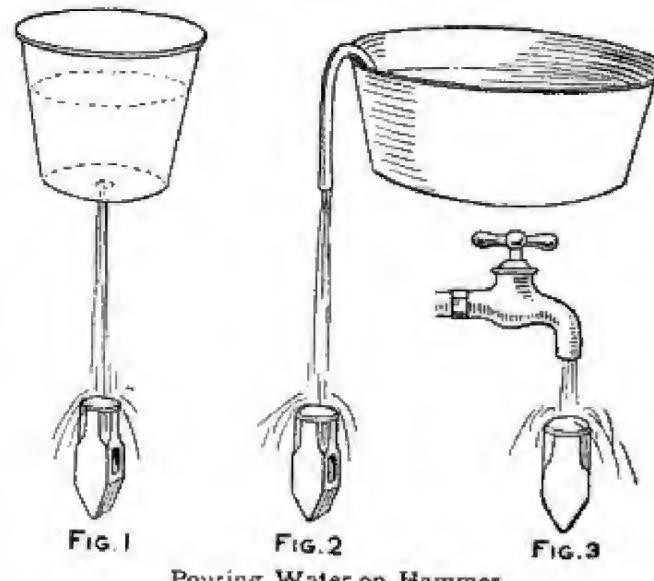
### Hardening Hammers

Hammers for working iron and steel are hardened with good results in the following manner: Heat the hammer to a cherry red, using a blast to produce a quick heat, then hold it so that a stream of water will strike the face and flash away from the eye. This will temper the face only, with the hardest part in the center. This will prevent water cracks and the cracking of the metal through the eye. A bucket with a hole in the center of the bottom (Fig. 1) or a siphon placed in a tub of water (Fig. 2) will do equally as well as the faucet shown in Fig. 3.

Do not take the hammer away from the water until it is perfectly cold, as it is not necessary to draw the temper. Ball-peen hammers are tempered in the same way, only less heat is used. If the steel be of a poor grade or a

harder temper is wanted, then hold the hammer lower down in the stream of water.

Hammers tempered by this method

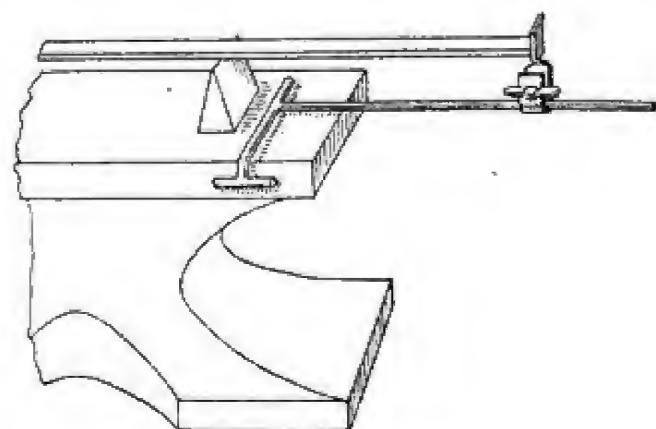


Pouring Water on Hammer

are good for working iron or steel, but it is not the right temper for stone and brick work. — Contributed by James E. Roy, Philadelphia, Pa.

### Gauge for an Anvil

A length gauge that can be easily placed in the round hole of an anvil and used for measuring while cutting red-hot metals is shown in the illustration. The gauge consists of a T-shaped rod with an adjustable attach-



Gauge on Anvil

ment to set for the lengths to be cut. The method of construction is obvious and further explanation is unnecessary.—Contributed by Raymond E. Chase, Mellville, R. I.

### Repairing a Broken Jaw on a Chuck

The lower lug on the jaw of a chuck used on our 18-in. lathe broke at a time when the shop was rushed with

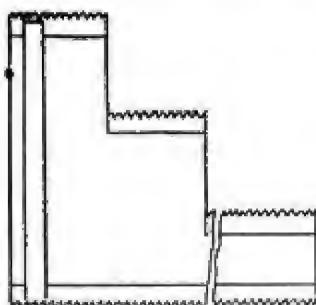


FIG. 1

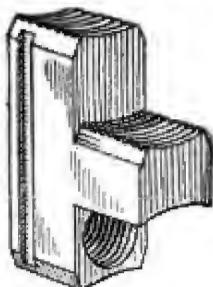


FIG. 2

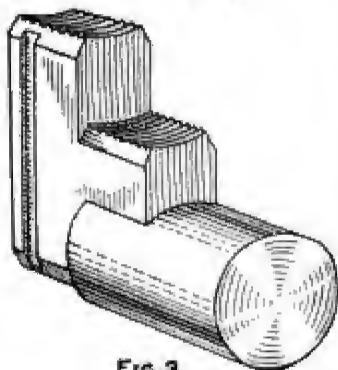


FIG. 3

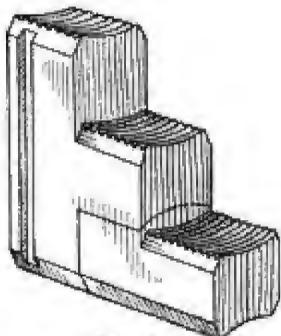


FIG. 4

Broken and Repaired Jaw

work, and a repair was made as shown in the sketch.

The broken jaw (Fig. 1) was placed in another chuck and the broken part centered. The piece was turned out so that a part of a circle remained on the lower part of the second lug. A hole was drilled in the center and tapped (Fig. 2). A piece of metal was then turned up round and one end threaded to fit in the hole. The round piece was plenty large (Fig. 3) to square up on a shaper and finish as shown in Fig. 4. The repaired part proved to be as strong as the other jaws and it saved considerable time that would be required to receive a new one from the factory.—Contributed by W. R. Ayers, Pittsburg, Pa.

### Distinguishing Wrought Iron from Steel

For many purposes wrought iron is superior to steel, although large quantities of soft steel are now used where wrought iron was previously employed. Wrought iron resists corro-

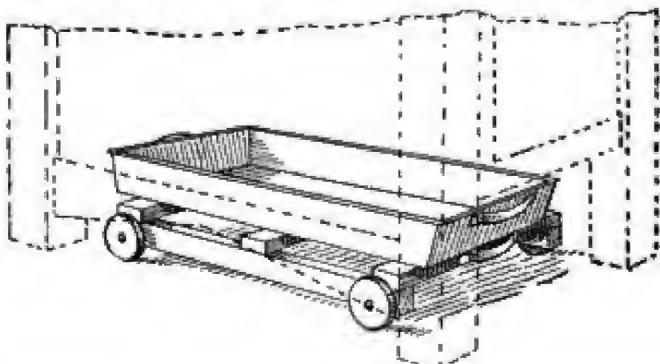
sion better than steel, as the slag in the fibers acts as a protective coating when corrosion sets in. For skimmers and stirrers used in brass melting, wrought iron lasts much longer than steel and should be used for this purpose. The Brass World gives a test that will serve to indicate the difference between wrought iron and steel. The sample to be tested is cleansed of grease and scale by scouring and is then immersed in a solution composed as follows:

Water .....	9 parts
Sulphuric acid .....	3 parts
Muriatic acid .....	1 part

The acids are poured into the water and allowed to cool. A glass or porcelain vessel is used. The specimen is allowed to remain in the solution for 15 or 20 minutes, when it is removed, rinsed in water and dried with a cloth. The fibers should now show plainly; but if not, the specimen is returned and allowed to remain longer. As iron is made up of a series of fibers, with slag between, it is a simple matter to distinguish it. Soft steel dissolves uniformly and without the fibrous structure found in wrought iron.

### Truck for a Refrigerator Drip Pan

Having been troubled with spilling water when drawing the drip pan from under the refrigerator, I devised the simple pan truck shown in the sketch. The wheels are  $2\frac{1}{4}$  in. in diameter with  $\frac{1}{2}$ -in. face. The size of the refrigerator will determine the dimen-



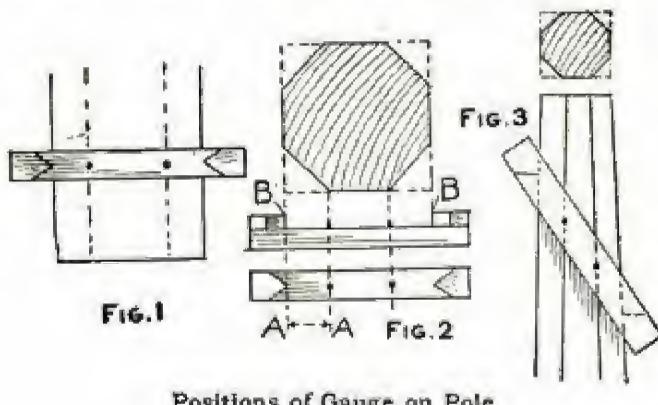
Pan on Truck

sions for the truck frame which can be made of spruce. The handle is made of a strip of tin.—Contributed by J. E. Cooley, Hartford, Conn.

### Gauge for Marking Tapering Octagon Poles

In making a flagpole or a mast, it is essential first to taper and square the stock and then cut it to an octagon before rounding. A gauge is shown in Fig. 1 for making the lines necessary to reduce the wood to an octagon. The gauge is made of a piece of pine, 1 in. thick, 2 in. wide, and about 4 in. longer than the widest dimension on the end of the pole. Cut the wood as shown in Fig. 2, so that it will fit neatly over the large end of the pole.

Lay out the octagon on the end of the pole and the distance AA will be the depth of the cut from the corner. Drive a nail through the gauge at each



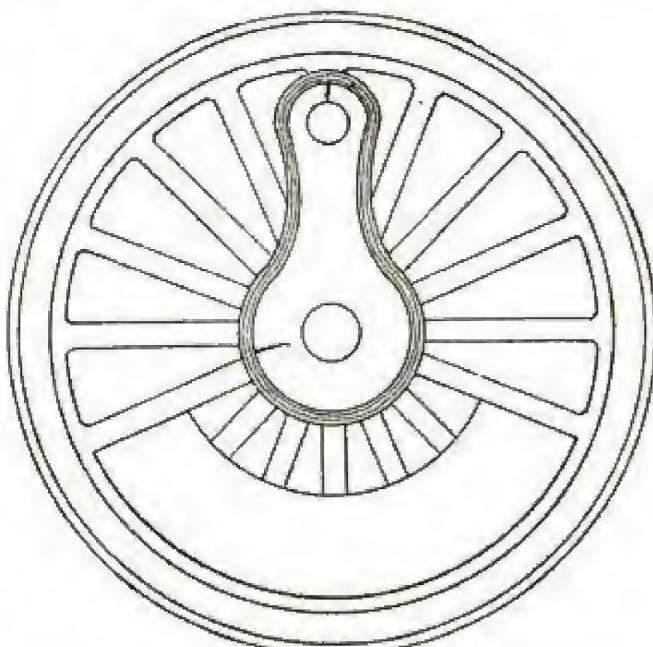
Positions of Gauge on Pole

inside point, A, and sharpen the ends for markers. Start the gauge at the large end of the pole and pull it toward the smaller end, at the same time twisting it so that the points BB will be close against the wood. The gauge in position at the small end of the pole is shown in Fig. 3. The points BB are shaped so the gauge can be turned as it slides toward the small end of the pole.—Contributed by F. O. Andersen, San Francisco, Cal.

### Repairing a Broken Locomotive Wheel

The crank part on a locomotive drive wheel was cracked in two places, as shown in the illustration, and an inexpensive repair was made by shrinking a 1½-in. square band of metal around the contour of the

crank. To keep the band from slipping off, the metal on the hub was

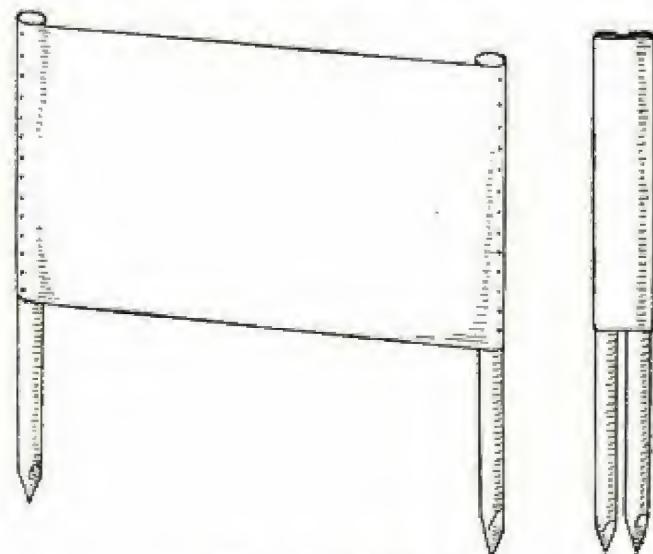


Band Shrunk on Cracked Crank

chipped off on an angle toward the center.—Contributed by Benjamin H. Baird, Kingsland, N. J.

### Plant Protector

A device for protecting plants from wind and rain can be made from stakes and a piece of canvas. The stakes may be of any desired length and if more than two are used, the plant can be protected from all sides. Three



Canvas on Stakes

stakes will form a triangle and four a square. When not in use, it can be rolled up and put away.

## An Inexpensive Drilled Well

By J. G. ALLSHOUSE

The unhealthful well sunk by old-fashioned methods, is practically a thing of the past in all localities where drilling machines are to be found. The only safe and successful way of get-

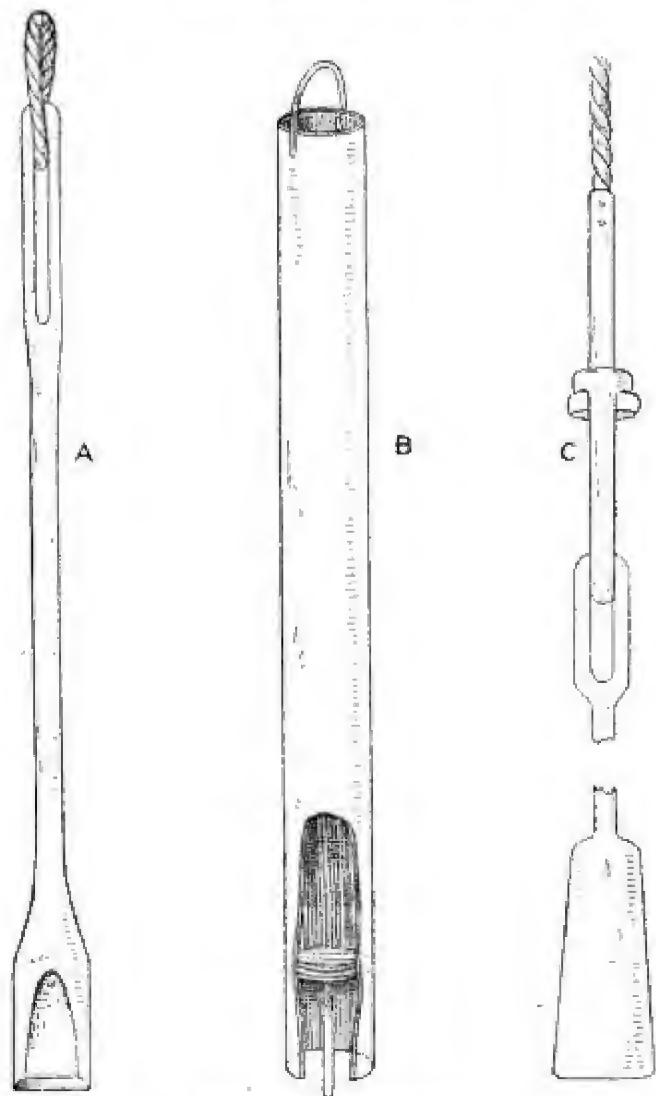


Fig. 1—Drilling Tools

ting a supply of well water is by casting to the rock, thus cutting off the impure surface water, and drilling into the rock until an artesian stratum is struck which furnishes water made pure by filtering through the rocks and sands of the earth. Where it is not possible to drill a well because of the expense or the lack of suitable machines, the dweller in the rural districts or suburbs, who has average mechanical ability, can accomplish the purpose by his own work and the use of easily constructed tools at an insignificant cost.

In Fig. 1 is shown some tools the writer used successfully to drill a well 34 ft. in depth. Any blacksmith can make them. To a bar of iron about 1 in. in diameter and 5 ft. long weld enough steel to form a bit. This bit (A) should be fashioned as nearly as possible like the regular bits used on heavy drilling tools. The face of the bit, or the gauge, can be about  $2\frac{1}{2}$  in. for starting the well, then reduced in gauge after the well is cased. A sand pump or bailer shown at B is necessary. It is made of a piece of  $1\frac{1}{2}$ -in. tin pipe about 3 ft. long with a heavy wire bent in the form of a bail and fastened in one end. A dart valve is placed in the other end. It is made by driving a wooden ring or core into the pipe so it will act as a valve seat for a piece of leather, through which a large nail or spike about 3 in. long has been driven. The valve seat is held in place by several small nails or tacks driven through the tin. In case the tin pipe cannot be procured, 1-in. iron pipe may be used. Manila rope,  $\frac{1}{4}$  to  $\frac{3}{8}$  in., is heavy enough to use with the bailer. For the drilling tools use  $\frac{3}{8}$ -in. or  $\frac{1}{2}$ -in. rope.

The tool shown in C is to be used when drilling a deep well. Two pieces of  $1\frac{1}{4}$ -in. pipe, one 5 ft. and the other 10 ft. long, are required to make this tool. Make from suitable material a pair of jars, which loop together like links in a chain with a play or stroke of about 18 in. These links each have a shank 1 ft. long, welded into each piece of the pipes mentioned. The one link is left open until they are welded to the pipes and then the link is closed by welding. The links must be made small enough to work freely inside of a 2-in. pipe. Make a steel bit like the one for the tool first described with a shank 1 ft. long, which is welded into the remaining end of the 10-ft. piece of pipe. Drill several small holes in the end of the 5-ft. piece of pipe to attach

the rope. Take a piece of 1-in. rope as long as will be required and fasten one end in the pipe with rivets. After riveting, drive some soft-wood wedges round between the rope and metal of the pipe.

The rig or derrick is made as shown in Fig. 2. It is about 15 ft. high, simply constructed of poles or scantling with pulleys, and any suitable windlass. A ratchet device can be attached to the windlass to regulate the rope, and a brake to save time when lowering tools in the well. The illustration shows the manner of drilling. A jerk line tied to the main rope is used to raise the tools and let them drop. The main rope is kept taut to get all the drop possible, and as the drill cuts deeper, it is let out gradually. If too much rope is let out at a time, it will be impossible to keep the hole round and smooth. Allow the tools to drop without aid in turning and they will make a nice round hole in rock. When drilling keep 3 or 3 ft. of water in the hole and after sinking

if it becomes wedged in the hole. A few upward strokes of the jars after

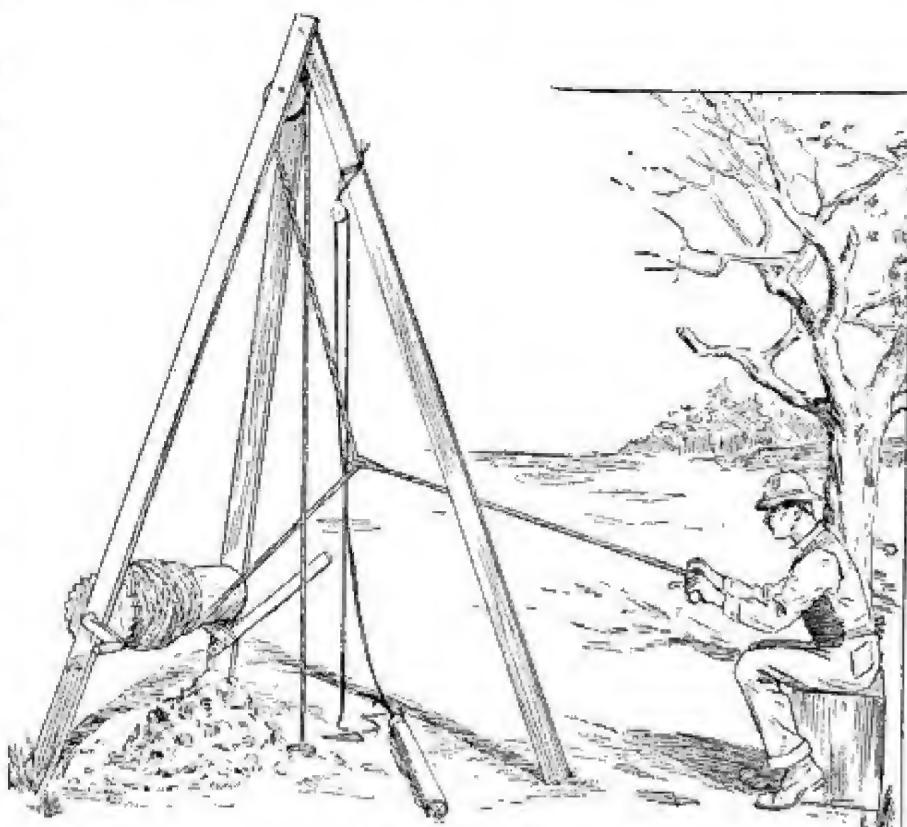


Fig. 2—The Derrick

loosening the ropes will be sufficient to remove a wedged drill. It is best to start a hole with a  $2\frac{1}{2}$ -in. bit and after it is down below the soft clay, which is liable to cave in, drive a joint of 3-in. casing. Continue drilling inside of the pipe until the hole is below the strata of surface water and impure drainage and case the well with 2-in. pipe. Reduce the size of the bit to

$1\frac{3}{4}$  in. and continue drilling inside of this casing until pure water is found. Drill deep enough below the point where this water is found to insure a basin to hold water enough for immediate demands, if the flow does not come fast enough.

When drilling a deep well, use a spring pole as shown in Fig. 3 in connection with the derrick. This pole should be from 20 to 25 ft. long with a block placed under it, 8 ft. from the end fastened to the ground and in such a manner as to raise the end of the pole

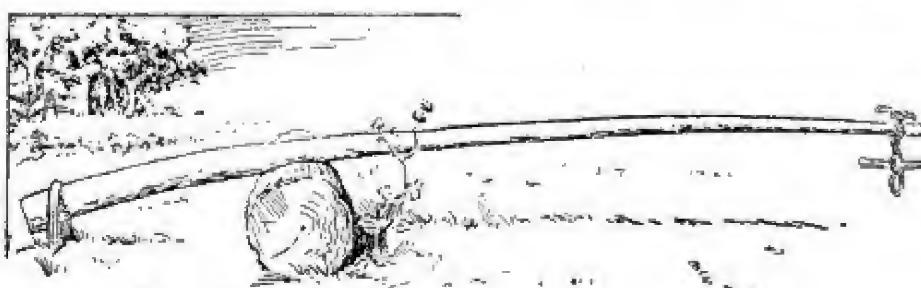


Fig. 3—The Spring Pole

from a few inches to 1 ft., as the case may be, pull the tool out and use the bailer to remove the sediment from the bottom of the well. The sediment mixes with the water and enters the bailer through the dart valve. The jars enable the driller to loosen a tool

over and about 4 ft. up from the hole. The rope holding the tool in the well is fastened to the pole with clamps which are arranged to turn on a swivel or by a link large enough to receive a loop of the rope. There should be a handle above the clamps or the link for use in turning the swivel. The first 15 ft. will be the hardest to drill with this rig and tools. If the formation is clay, a  $2\frac{1}{2}$ -in. well auger may be used to drill the first 15 ft., but if it is gravel or the like, the tools must be spudded in the same as with the derrick, until the hole is deep enough to use the spring pole.

The bits used with either of these methods determine to a great extent the ease and speed of drilling. For soft material they may be made rather sharp and shaped as in C, Fig. 1, but

for rock, the bit needs to be fashioned more like the ones used on heavy water-well, oil or gas-well machinery, that is, a rather short bevel for the cutting edge—in fact almost blunt. As it wears out of gauge, even if not too dull to drill well, it must be dressed frequently to preserve the gauge. It is almost impossible to give instructions as to the proper shape of a bit. This must be learned by experience of the driller. If possible, examine a large bit used on the regular drilling machines and note the shape. The speed of drilling by hand is greater than would be expected after a slight experience in drilling at the top of the hole. With the tool as shown in C, Fig. 1, operated with the spring pole, 30 or 40 ft. can be drilled in clay or 10 to 15 ft. in rock, in a day.

### Pipe Tool Attachments for Monkey Wrenches

Two useful attachments that can be easily fitted to the ordinary types of monkey wrench to make them suitable for working on pipe are described by the Motor Magazine of Canada. The

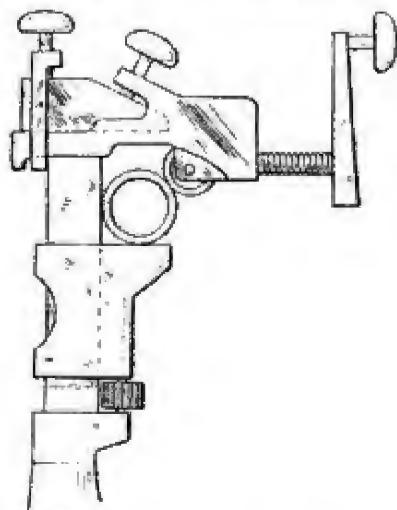


FIG. 1

Pipe-Cutting and Wrench Attachment

one outlined in Fig. 1 is a simple pipe cutter comprising a jaw member having a recess to receive the jaw of the wrench, this being provided with parallel arms adapted to straddle the shank of the wrench. A cutting wheel or roller is mounted in a block sliding in

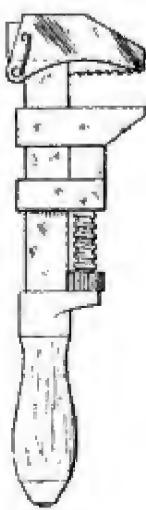


FIG. 2

and guided by a suitable yoke piece. This can be moved as desired by turning the crank on the feeding screw. Simple clamp screws make it possible to easily and quickly attach it securely to the wrench. The pipe is placed between the movable jaw of the wrench and the cutter, and is backed by the shank of the tool. The device is used in the same manner as a pipe cutter, the wrench being revolved around the pipe and the pressure on the cutter block being increased gradually to cut deeper into the pipe each revolution.

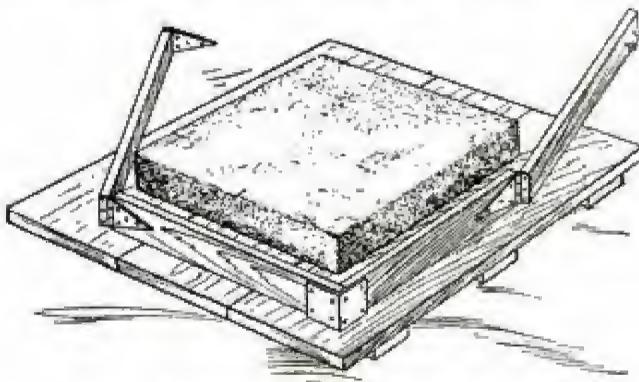
The device shown in Fig. 2 is a simple member having a series of serrations or teeth to permit it to grip a round surface. This is made of hardened steel and has a simple clip member by which it may be easily attached to the fixed jaw of the wrench. The U-shaped plate is adapted to closely engage the top and sides of the wrench jaw. The serrated plate is pivoted to the plate to lie beneath the face of the fixed member. A locking member, composed of a pin having a grooved end and retention spring, is passed through

the U-member back of the wrench shank to hold the attachment in place. The spring catch engages the groove in the pin when the latter is in the position indicated.

#### Form for Molding Concrete Slabs

A form for making concrete slabs that is easily made, convenient to handle, and constructed similar to a snap flask used by foundrymen, is shown in the accompanying sketch.

The form may be made in any size from  $\frac{3}{4}$  or 1-in. lumber. Two of the sides are nailed or screwed securely together at right angles. The other two sides are hinged on the ends of these two joined sides as shown. When in position, the two hinged sides are



Removing Form from Block

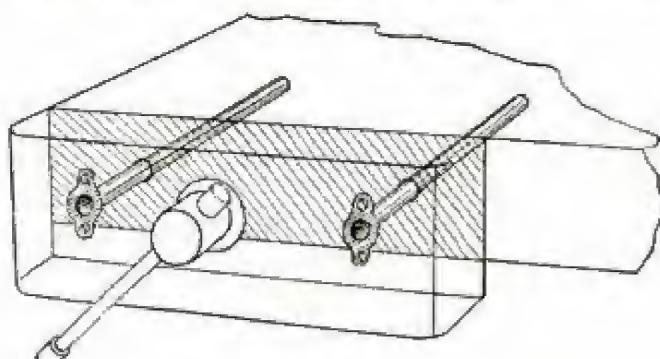
locked by means of a hinge and two screw eyes or a large hasp. The screws are put into the wood through the screw holes in the long wing of the hinge.

Paper may be placed between the concrete and the inner faces of the frame, or the frame may be greased instead. When the concrete is set, the screw eyes are withdrawn, the frame opened, the two sides swung clear of the slab, and the frame pulled away from the other two sides of the slab.—Contributed by James M. Kane, Doylestown, Pa.

#### Pipe Guides for a Bench Vise

In fitting up a home-made bench with a vise, I found it rather difficult to mortise in the two guide pieces, so I decided to make it an easier way. I

had an iron bench screw, and my vise block being  $1\frac{3}{4}$ -in. maple, I procured two pieces of  $\frac{1}{2}$ -in. pipe, each 15 in.



Guides in Bench

long with threads on one end, and each was fitted with a  $\frac{1}{2}$ -in. waste nut. The block was then screwed up tight against the bench by means of the screw and two 1-in. holes bored through for the guides, which were easily slipped through, and the waste nuts screwed to the outside.—Contributed by Edwin Otto, Chicago, Ill.

#### Baseboard Marking Hook

The device shown in Fig. 1 is for marking a line on the baseboard for sawing closely against a door facing. It consists of a piece of wood, A, Fig. 1,  $2\frac{1}{2}$  in. wide and 12 in. long, squared up true on all sides. A 1-in. opening, B, is sawn out 10 in. long. The hook is placed on the baseboard D, Fig. 2,

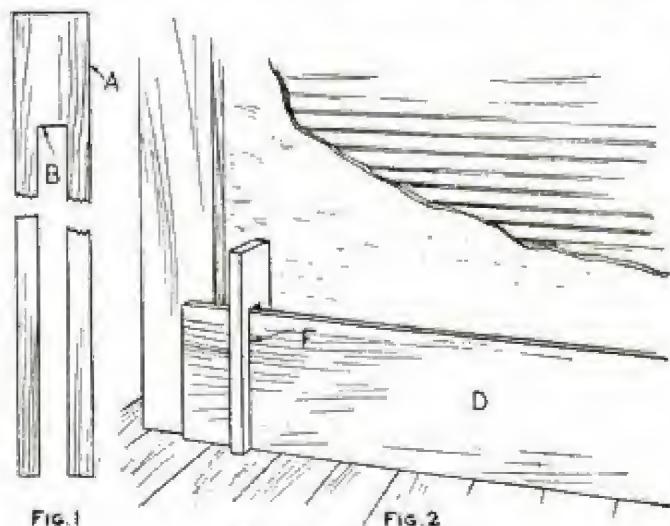


FIG. 1

FIG. 2  
Hook on Baseboard

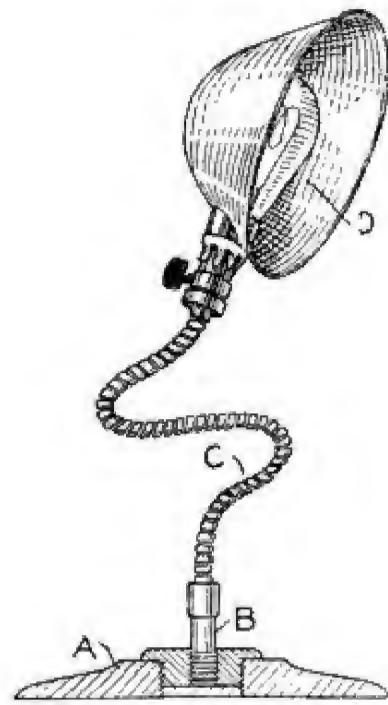
and the line made along the opposite edge from F when the hook is against the facing.

### Portable Lamp for the Garage

In garages and repair shops, extension cords for electric lamps are practically indispensable, and strange though it may seem, there are few, if any shops, that have practical supports for these portable lamps, says Motor Age.

The illustration shows a home-made portable lamp of gas pipe and fittings. The base A is a 2-in. pipe flange, 8 or 10 in. in diameter. A reducer is used in the 2-in. hole to make the size  $\frac{3}{4}$  in. A  $\frac{3}{4}$ -in. nipple and a plain coupling is turned into the base and fastened to a piece of flexible conduit, C, which connects the base with the electric lamp D.

All the fittings included in the make-up of this lamp are standard and may be assembled without the use of tools. This lamp can be placed anywhere about or under the automobile. The lamp may be raised, lowered, or twisted into almost any desired position by means of the flexible conduit, which is stiff enough to hold it in the position set.

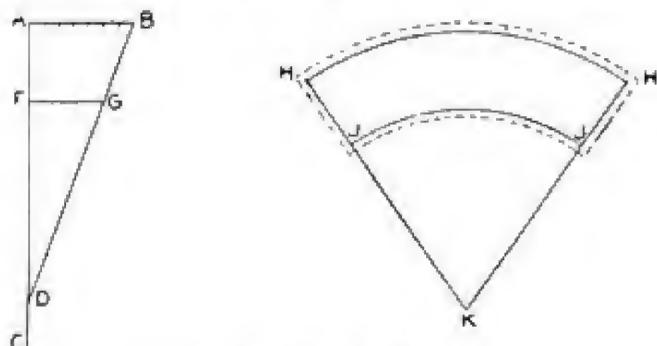


### A Flaring Pattern Rule

Draw the lines AB and AC with an ordinary square and mark a point B from A on the line equal to one-half the large diameter of the finished object. The slant height is from A to F. Draw a line parallel to AB on the slant height, or FG. One-half the small diameter of the finished object is marked on the line at G from F. A line drawn

intersecting B and G and extending to D, establishes a center from which an arc of a circle is drawn with a radius from A to D.

The arc is shown from H to H with the center K. The small arc having a radius from D to F is shown from J to J. The length of the arc is determined by spacing the line AB into seven equal parts and using the dividers set for one space to step off the arc HH 22 times for one piece, 11 times for two pieces,  $7\frac{1}{3}$  times for three pieces and  $5\frac{1}{2}$  times for four pieces. The pattern is then given sufficient edge, as shown by the dotted line, for seams or other

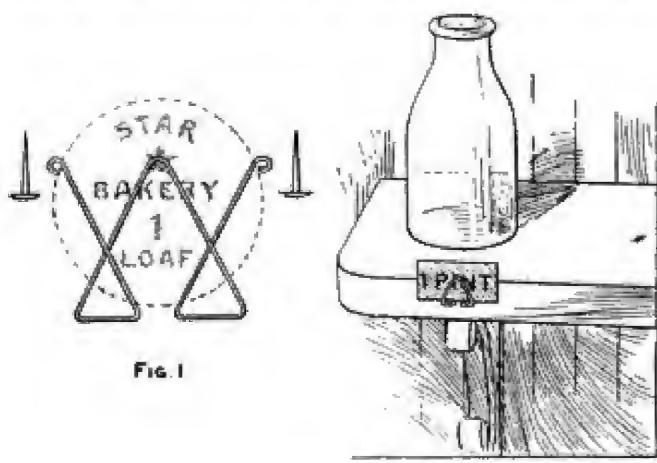


Laying Out the Pattern

purposes.—Contributed by S. C. Shipman, Steubenville, Ohio.

### Bakery and Milk Check Holder

The accompanying illustration shows how common paper clips can be used to hold milk and bread checks. The paper clip, Fig. 1, is fastened with two



Method of Using a Paper Clip

small nails or brads to the edge of the shelf, as shown in Fig. 2.—Contributed by Victor Labadie, Dallas, Texas.

### An Inexpensive Flower Pot

An artistic flower pot can be made from an old paint keg—one made of oak preferred. Saw off one of the ends, leaving two-thirds of the keg, remove the hoop and scrape the paint or varnish from the wood. Sand the hoops and paint them with bronze and stain the wood a dark color, allowing the grain to show; then replace the hoops and drive them tightly in place. Fasten them to the keg by boring holes through both hoop and stave and driving pins in the holes. Bore several holes in the bottom of the keg for drainage. Attach drop handles on opposite sides of the keg.

### Heating a Funnel for Thick Oil

It is difficult to empty a keg of oil into the engine-room tank or can in cold weather, as the oil will not run through the funnel fast enough to take the flow from the bung hole. The remedy is a simple one and can be adapted to any sized funnel. If a coil of small copper pipe is wound spirally round the mouth of the funnel and a small amount of steam applied to the pipe, the oil will flow steadily. The heavy oils that need warming up do not generate explosive gases, so the method is quite safe.—Contributed by Hy. W. Hankin, Troy, New York.

### Setting a Diamond for Dressing Emery Wheels

The holder is made of a piece of machine steel with the end prepared in a lathe, as shown in Fig. 1. The hole in the center must be large enough

to easily take the base or largest part of the diamond and about  $\frac{1}{16}$  in. deeper than the depth wanted when finished.

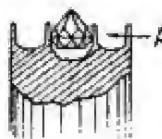


FIG. 1

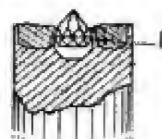


FIG. 2



FIG. 3

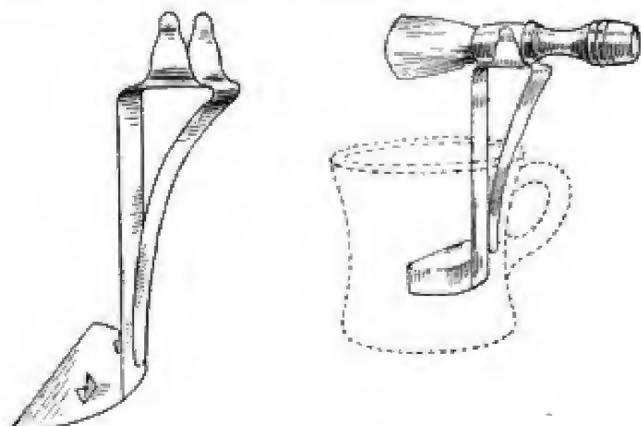
#### Setting Diamond in a Steel Rod

Make a groove around the hole, as shown at A, so that the metal between will be very thin.

Place enough clean iron filings and flux in the hole to keep the diamond at the proper height. The filings are important to make a perfect seat for the base of the diamond. Select the largest part of the diamond and set it firmly on the filings and close the thin metal in snugly all around with a small punch. Provide a small hole at B, Fig. 2, to admit spelter to the filings. Fill the groove heaping full of spelter and flux. Heat slowly and evenly to the melting point and then remove the holder from the fire and let it cool slowly. Finish the end as shown in Fig. 3.—Contributed by Rudolph Miller, Shippersburg, Pa.

### Soap and Brush Holder for a Shaving Mug

An attachment for a shaving mug for holding the soap and brush can be made of a piece of sheet metal. The illustration plainly shows the construc-

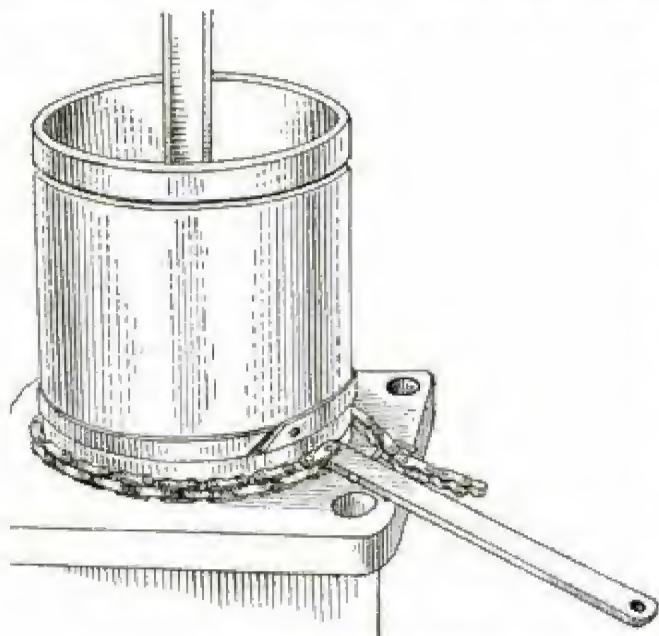


Holder and Position on Cup

tion. The piece is cut and shaped to slip over the edge of a cup. It can be easily attached and removed.

### Tool for Holding Piston Rings While Replacing Piston

When replacing pistons in cylinders of gasoline engines, some device must be provided for holding each ring in its groove so it will easily enter the bore.



Holding a Ring in Place

Copper wire may be used to advantage where one or two pistons of the same size are to be replaced. In repairing engines of various sizes and replacing their pistons, the tool shown in the sketch can be quickly applied to each ring just before it enters the bore.

The tool is made from a length of bicycle chain with a lever attached to one end on which a hook is fastened in such a manner as to take up the chain and close it in on the ring. The sketch shows its construction.—Contributed by Orlia A. Young, Loudonville, Ohio.

### Small Spanner Wrench and a Nut-Threading Tool

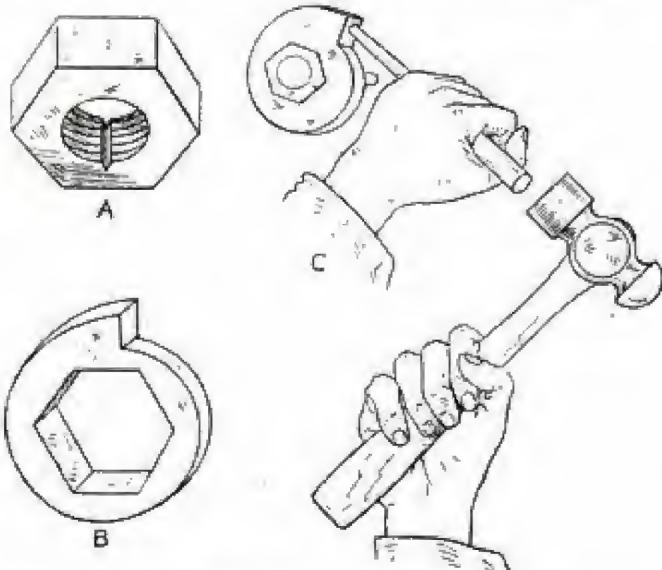
In motor car repairing, one is often forced to drive a particularly stubborn bolt or bearing pin, having a threaded end, out of place because it has become firmly fixed by rust. The thread is bruised to some extent, even if care is taken in driving the bolt out, by some projecting piece of metal in the bearing in which it sits.

When the bolt is replaced, it is often difficult or even impossible to get the

nut to run on the damaged thread, says the Motor Magazine of Canada.

A simple screw thread corrector may be made of a steel nut of the right size to fit the thread. This is softened, and a V-shaped slot cut on the inside, running across the threads and a little deeper than the bottom, as shown at A in the sketch. This must be cut very carefully with a fine three-cornered file, so that no burrs adhere to the edges. The nut is then tempered to a light straw color, and when cooled it is ready for use. Screw this nut on and off the threads several times and they will be toned up and straightened, and the original nut can be replaced without difficulty. A set of these handy tools can be made from a number of standard sized nuts commonly used and they will do the work as well as the more expensive stocks and dies.

In removing inaccessibly placed nuts and bolts it is often necessary to screw these out by driving a chisel or punch held against the corners of the facets, which damages them and makes it difficult to apply a wrench to the nut or bolt head with success when this is necessary. The small spanner shown in B is intended to be placed over the nut or bolt head and the projection struck with a hammer directly, or

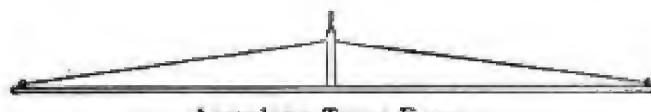
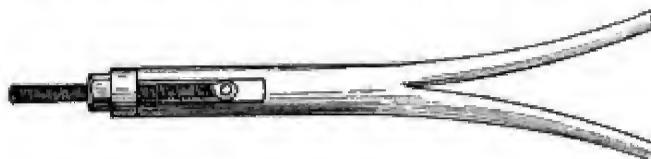


Threading Die and Spanner

turned by a chisel struck with a hammer, as shown by C. These can be made in different sizes to fit standard nuts and bolt heads.

### A Truss for Aeroplane Construction

A truss for strengthening the weak places in aeroplane construction is shown in the sketch. It is made of a  $\frac{1}{16}$ -in. bolt having the head cut off and a hole drilled through for a No. 18-gauge wire. The body is made of ash with a hole bored into the top end the length of the bolt and the side cut out to form a slot. The other end may be formed to suit the frame where it

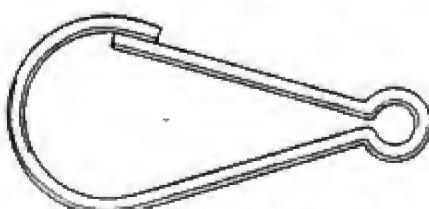


*Aeroplane Truss Frame*

is to be placed. A brass ferrule is placed under the nut of the bolt and over the end of the slotted part. The tightening of the truss is plainly shown.—Contributed by F. W. Stromer, Gig Harbor, Wash.

### An Emergency Snap

A snap can be made from an ordinary split cotter pin for temporary use. To make the snap, spread the parts, cut off one end and bend the



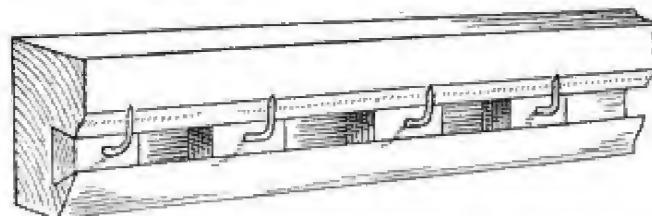
*Snap Made of a Cotter Pin*

other as shown in the sketch.—Contributed by Lester L. Kell, St. Louis, Missouri.

### Adjustable Curtain Stretcher

There is hardly a household in which a curtain stretcher does not, at some period of the year, play an important part, says the American Carpenter and Builder. A prominent woodworking concern makes what is known as the

adjustable pin stretcher, the brass nickel-plated pins which hold the curtain being set in adjustable sliding



*Adjustable Hooks*

blocks. The sketch shows how the groove is cut for the sliding blocks to adjust themselves to any position endways.

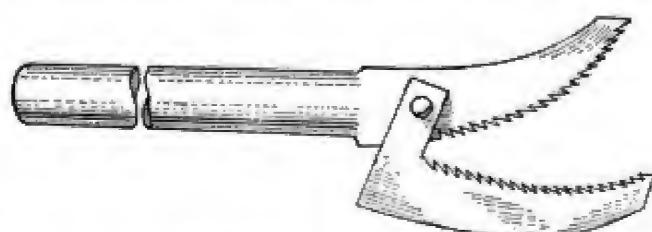
### Locking a Wood Screw

Many times advertisements or framed notices fastened with screws on the outside walls are stolen for their wood frames. By using the ordinary wood screws with the heads filed on two sides, against which the screwdriver blade bears when unscrewing, it makes the screw easy to turn in but impossible to turn out.—Contributed by Percy d'Romtra, Cape May Point, N. J.



### A Simple Pipe Wrench

The illustration shows a very serviceable wrench which may be made in a short time. The wrench is, in every way, as efficient as the best factory product. It is forged from steel and the teeth filed in the jaws before tempering. This wrench may be made in all sizes and will be found very



*Home-Made Pipe Wrench*

handy for any branch of the mechanical trades.—Contributed by A. J. McKelvie, Ladysmith, B. C.

### Boring Oval Holes

Lay out and cut to shape a form or guide, A, Fig. 1, of machine steel, as required, and fasten it to the work to

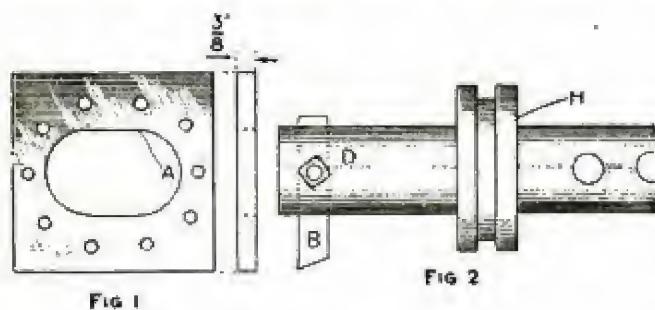
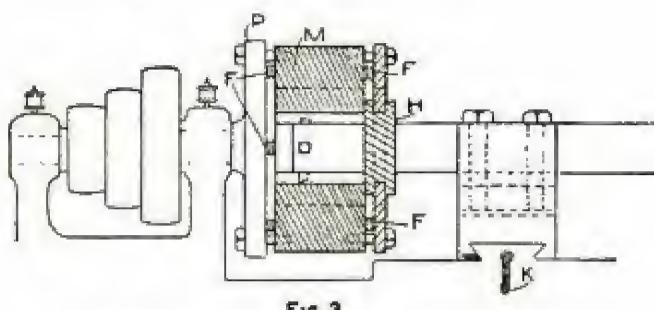


FIG. 2



Shape and Position of the Guide Form

be bored or turned. The boring bar (Fig. 2) has the usual cutter, B, fastened with the setscrew D. A collar, H, is made a sliding fit for the bar. Drill the guide and work for cap screws and place parallels, FFF, Fig. 3, between the guide, work M, and faceplate P, for clearance. The boring bar collar H is held against the guide plate by attaching a weight to a chain, K, which is fastened to the tool-post feed after removing the screw.

The guide plates can be made in various shapes for making cams, cylinder, jig, and experimental work.—Contributed by J. B. Roberts, Everett, Massachusetts.

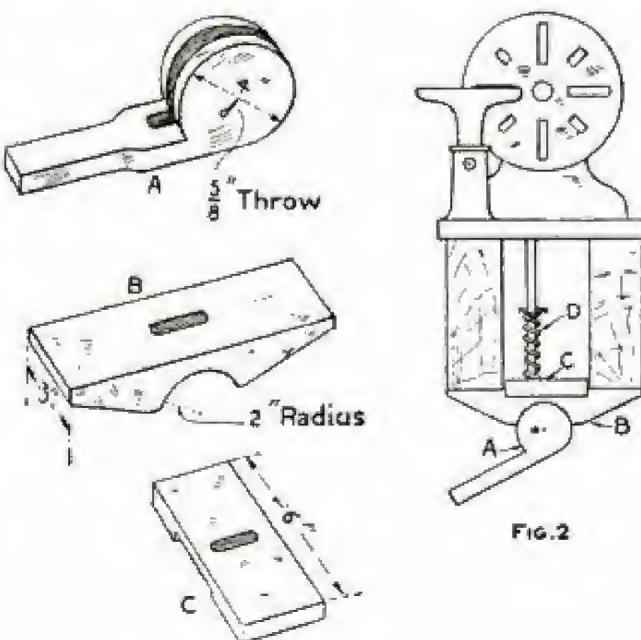
### Preparing Logs for Sawing

All the logs for a hardwood mill were shipped by rail and a large amount of mud and gravel was found sticking to the surfaces. A derrick was used to load the logs on a car in the yard and at the foot of the incline the car was stopped for a short time, and a stream of hot water from an injector cleaned off nearly all the mud, and softened what it did not remove.

The mill turns out a large amount of quarter-sawed material, and saws are changed three times a day. The forced stream of water from an injector is better than cold water, and the saws are saved at a trifling expense.

### Eccentric Clamp for Wood Lathe Rest

A quick acting eccentric clamp for a rest on a wood lathe can be made of parts as shown in Fig. 1. The eccentric lever A takes the place of the regular hand wheel on the bolt. The lever turns in a half circle bearing, cut in the cross block B. The piece C is fastened on top of the block B to keep it straight across the bed of the lathe. Both pieces have a slot cut in them for the lateral movement of the bolt. The lever A is fastened to the end of the bolt, a little off center, with a pin. A spring, D, is placed above the clamp to release it from the bed when adjusting the rest.

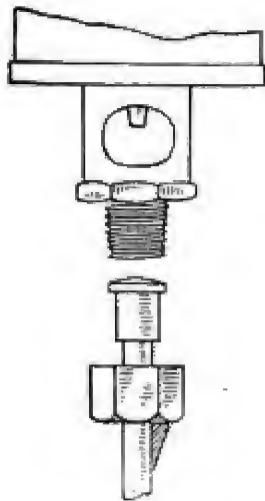
FIG. 1  
Clamping a Wood Lathe Rest

The lever may be tightened and released with the foot, thus leaving both hands free to move the rest.—Contributed by C. M. Graham, Oskaloosa, Iowa.

CA kitchen-sink putty is made of litharge, 20 oz.; dry slaked lime, powdered, 1 oz., and linseed oil.

### Lug on a Pipe to Hold a Locknut

Sometimes a lubricator or steam gauge has, of necessity, exceedingly long connecting pipes of copper for pressure or oil feed, and a great deal of annoyance is caused by the connecting nuts slipping down on the pipe to a turn or other fittings. Where they are located over a hot boiler or leading through a maze of other hot pipes, it is dangerous to reach for the nut and slip it back to place. A good way to keep the nuts up near their place is to braze a small brass lug to the copper pipe, a little below the joint. It will save a great many burned wrists and, if placed on the back side of the pipe, it will never be seen. The nut cannot slip past the lug.



### Shear-Holder for Paperhangers

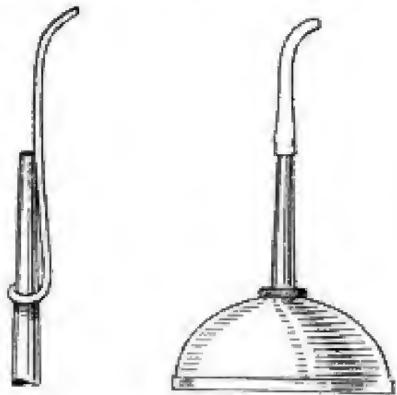
An ordinary wire opener such as is used for opening bottles having a crown top makes a good shear-holder for paperhangers. The opener is sewed to the outside of the overalls as shown in the sketch. The angle with the opening is suitable for the shears or a painter's duster.—Contributed by Hazel Duncan, Denver, Colo.



The ornamental raised ledge around the keyhole of a lock often keeps the latch key from readily entering. Unless the key happens to be put directly in the hole, the ledge will prevent it from slipping in. The ledge can be removed in a few minutes by cutting it off with a sharp cold chisel.

### Extension Spout for an Oil Can

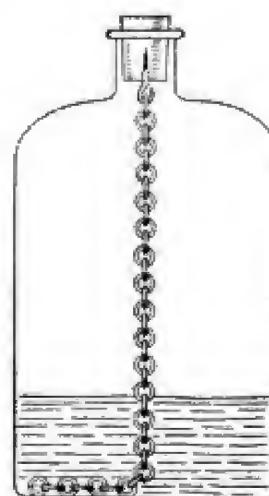
The straight spout on an ordinary oil can is not long enough or shaped right to oil bearings located in complicated machinery. The straight spout can be extended and a bend made in it by attaching a piece of wire of the desired length and shape, then drawing a piece of small rubber tubing over it. —Contributed by Harry S. Moody, Newburyport, Mass.



### Bottle Cleaner

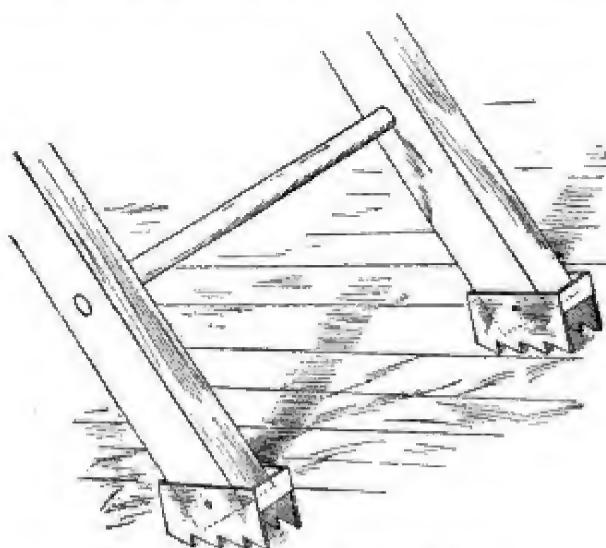
The usual method of cleaning the inside of a bottle is to put into it some nails or sand, partly fill with water, and shake well. While this will clean the bottle, there is a possibility of leaving a nail or some sand within. This trouble may be overcome and the bottle thoroughly cleansed by using a chain cleaner attached to the cork of the bottle as shown.

The cleaner can be made of an old key chain attached to the cork with a small brass screw eye. The chain should have a few knots of cord tied at intervals in the links. Pour some warm water in the bottle, place the chain and cork in and shake well. This is especially useful for cleaning tea, nursing and all kinds of small medicine bottles. —Contributed by David Major, Providence, R. I.



### Preventing the Lower End of a Ladder from Slipping

The lower end of a ladder may be kept from slipping by using a device made from heavy sheet metal, as



Nonslipping Ladder Ends

shown in the sketch. The attachments are made to fit the wood loosely, and the edge intended for the lower part is notched like a saw. A hole is drilled through the metal and a corresponding hole is bored in the wood for a drawpin or bolt. This makes them fit the base, no matter at what angle the ladder slants, and also provides a way to quickly remove them.—Contributed by W. A. Jaquythe, Richmond, Cal.

### A Lapping Tool

An adjustable tool used for lapping out hardened bushings such as wrist pin bushings for automobile engines, can be made of babbitt metal. The babbitt is placed on a taper arbor turned from cold rolled steel. A  $\frac{1}{4}$ -



Detail of Lapping Tool

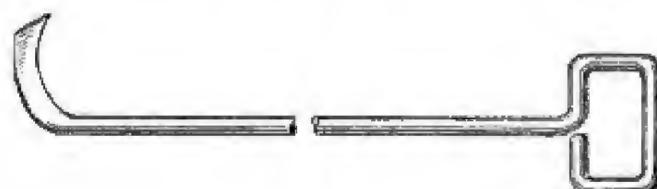
in. keyway is cut and a key inserted the full length of the taper. Use a piece of tubing larger than the hole

and as long as the lap to be made and place it on end on a smooth surface for a mold. Hold the taper arbor in the center with the small end down and fill the space with melted babbitt. When cold, remove the tube from the babbitt and turn it to the right size. Remove the babbitt from the arbor and split it opposite the keyway.

If there is a great deal of lapping of one size, it is best to use copper instead of the babbitt. When using copper, there is no need of a keyway as this metal will grip the taper. The tool can be used in a drill press or a lathe. As the lap wears, it is driven up on the taper arbor to increase the size.—Contributed by V. E. Swanson, Chicago.

### A Pruning Hook

The pruning hook shown in the illustration is for cleaning the dead wood from raspberries, currants and other small fruit, as the handle per-



Made of a Steel Rod

mits it to be drawn towards the worker, thus making the task much easier.

It is made from a length of steel rod,  $3\frac{1}{2}$  ft. long, one end of which is bent into a hook and flattened. The flattened part is tempered and ground to a knife edge. The opposite end is bent into a handle as shown, making it easier to grasp than the ordinary straight handle.

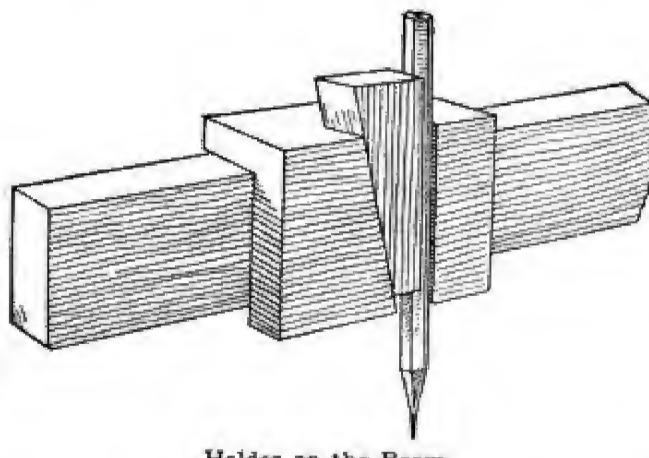
### Fitting Glass in Picture Frames

When cutting glass for picture frames do not fit it to the rabbet tightly, says the Master Painter. Allowance should be made for expansion and contraction. For the same reason, springs should not be forced hard on the packing at the back of the glass.

### Pencil Holder for Beam Compasses

An easily made, yet very efficient pencil holder for use with beam compasses is shown in the sketch. Care should be taken that the wedge-shaped piece have the same taper as the groove in the sliding block. One side of the wedge should be beveled and made to dovetail into the block. This will give a better grip on the pencil.

This pencil holder has an advantage over the ordinary type of holder in that it can be easily slipped along the trammel rod and any number of lines made without the usual tedious and very trying method of screwing and unscrewing the head as in the case of the ordinary beam compass. Of



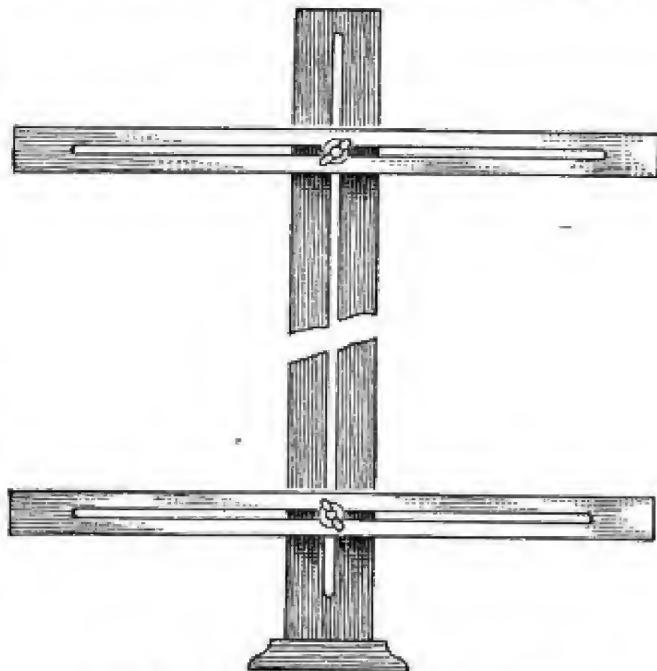
Holder on the Beam

course, it has to be grasped in the hand while the line is being made, but if both are grasped in the hand at the same time, no trouble will be experienced.—Contributed by Wilfred Butler, Perth Amboy, N. J.

### A Panel Spacer

The device shown in the sketch is for use in spacing panels in painting, paper hanging and decorating. In use, the bottom of the spacer is placed on the baseboard and the crossarms are set to suit the width of the stiles for the panel. When it is once set, no change will need to be made for the entire room. When not in use, the spacer can be folded up for carrying or storing. The crossarms can be made of wood or metal. If made of wood, they should be lined on both sides with channel brass and counter-

sunk screws, so that they can be used as a straightedge for trimming paper



Marking Boards in Position for Use

with a butting knife.—Contributed by A. E. Johnson, Frankfort, Ind.

### Gauge and Protector for a Hatchet

The attachment for a shingler's hatchet, as shown in the sketch, can be used as a gauge (Fig. 1) in shingling, and a protection for the edge (Fig. 2) when the hatchet is being carried to and from work or placed in a tool box.

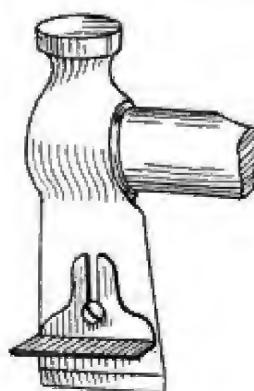


FIG 1

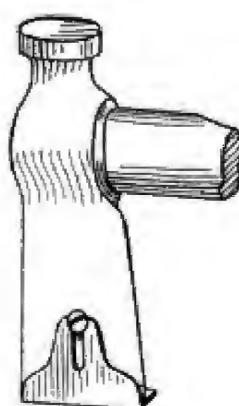


FIG 2

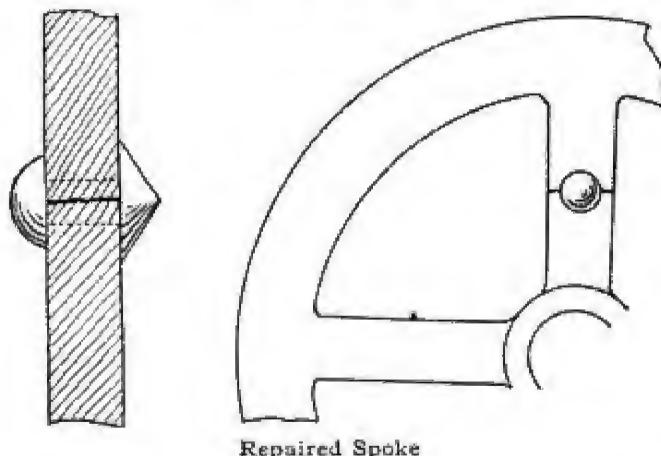
Attachment as Gauge and as Protector

The illustration shows its construction and how it is attached to the blade of the hatchet.—Contributed by M. M. Burnett, Richmond, Cal.

**C**A strong solution of oxalic acid will usually remove stains from lumber.

### Repairing a Cracked Spoke in a Wheel

A cracked spoke may be permanently repaired by drilling a hole through the crack and putting in a rivet. The rivet heads prevent side play in one direc-

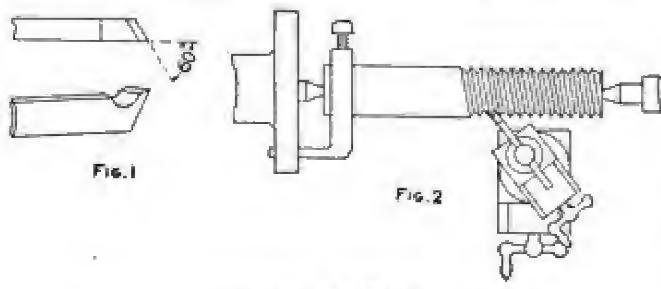


tion and the shank prevents motion in a direction at right angles to this.—Contributed by Will Parker, Olaf, Iowa.

### An Improved Thread-Cutting Tool

A common thread-cutting tool is not free cutting as it has no top rake. The strain being so great on such a tool, it is hard to keep it sharp and in good condition.

If a lathe has a compound rest, the tool shown in Fig. 1 may be used for cutting V-threads. The compound rest is set at 60 deg. with the axis of the work as in Fig. 2 and the tool is set with the thread gauge in the usual manner. This tool is given a top rake



Tool in Position

and cuts a clean clip from the edge, the feed being set to the work by the compound slide.—Contributed by E. R. George, Baltimore, Md.

**T**he lead screws of a lathe should be adjusted from time to time.

### How to Make Tweezers

Every workman in a factory, garage or home workshop should be provided with at least one pair of "sliver pullers" or tweezers. A sliver in the hand is a very painful thing, especially if it is run under a nail, and should be removed as soon as possible. If you do not care to buy the tweezers, but have a little spare time, you can make them from a broken hacksaw blade, the teeth of which have been ground off. Heat the blade in a fire and bend it to the shape shown in Fig. 1. Do not try to make the bend after one heating, as the metal is so thin that it cools before the bend can be completed. The sides can be ground out in curves and the surface highly polished. After polishing, lay the tweezers on a heated stove and allow the metal to take on a blue finish.

The tweezers shown in Fig. 2 are made with flattened instead of sharp points. The latter are made of the per-

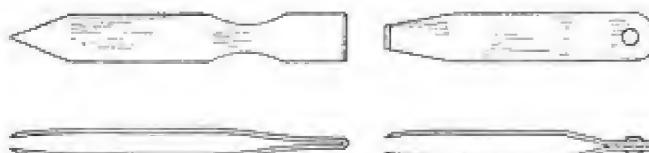


FIG. 1  
Tweezers Made of Broken Hacksaw Blades

forated ends of the saw blades and riveted together.—Contributed by Donald A. Hampson, Middletown, New York.

### How to Use an Expansive Bit

I was boring a 1½-in. hole with an expansive bit in a dry, hard maple timber, and it took a good deal of muscle to keep the bit turning, says a correspondent of the Wood-Worker. A carpenter passed and advised me to turn the cutter of the bit in the same direction as the handle of the brace, and stand with the grain or length of the stick. The result was it lightened the strain of the cutting a good deal and taught me something new. The hardest part of the cut, across the grain, is made while you have the greatest leverage on the brace.

### Tin Tongs for the Kitchen

A device which will often be found useful in the kitchen is a pair of tongs cut out of heavy tin and shaped as shown in the sketch. The length is 20 in., with the width of each member  $\frac{1}{2}$  in. at the points and  $\frac{3}{4}$  in. in the middle where it is bent. Corrugating the points will cause them to hold more satisfactorily. Any tinsmith will cut out these tongs for a small price, and they will last for years. They can be used for taking out boiled eggs, extracting pickles from a deep jar, removing soap from hot water, and also for washing the inside of lamp chimneys. The corrugated points will also hold a dust



A Useful Kitchen Utensil

cloth firmly, and there are scores of other uses which will occur to the intelligent housekeeper.—Contributed by Katharine D. Morse, Syracuse, N. Y.

### Coat Hanger for the Shop

The device shown in the accompanying illustration is used for hanging up coats in the workshop on a nail well above the heads of persons passing by. The coat is hung on the peg and the stick is suspended on the nail by means of the hole shown near the end of the stick.

The stick may be 5 to 6 ft. long and the peg or dowel about 5 in. long. The



A Coat Hanger for Use in Shops

hole for the peg is about 6 in. from one end of the stick and the other hole about 3 in. The diameter of the holes and of the peg may be about  $\frac{5}{8}$  in. The stick may be made of  $\frac{7}{8}$ -in. stuff, and taper in width from 4 in. at the top to 2 in. at the bottom.—Contributed by William M. Kishpaugh, Harrisburg, Pennsylvania.

### Home-Made Tire-Upsetting Machine

The work of upsetting tires can be done so well with home-made devices

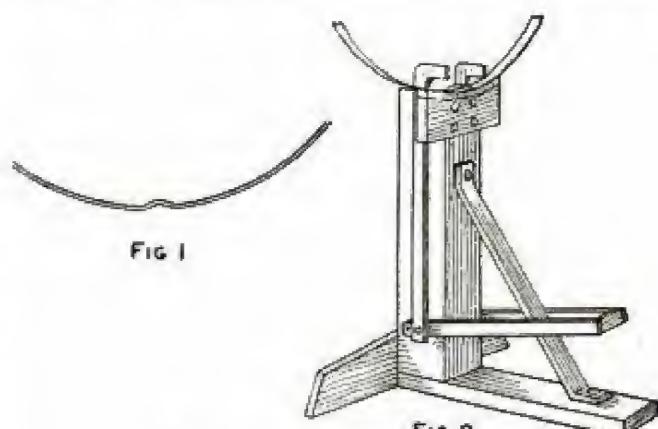


FIG 1  
Easy to Place Tire in Clamp

that it does not require the expensive upsetting machine in a small shop. While the small clamps do good work, they are not easily handled by one person. The illustration shows a device which, although more elaborate, can easily be constructed by any smith. With all of the devices a bend must be made in the tire as shown in Fig. 1, then after taking a good heat, the tire is set on the anvil of the upsetter (Fig. 2) and clamped in place by a pressure of the foot on the treadle. The large parts are made of wood and fitted with a metal anvil and clamps.—Contributed by John C. Ham, Pine City, N. Y.

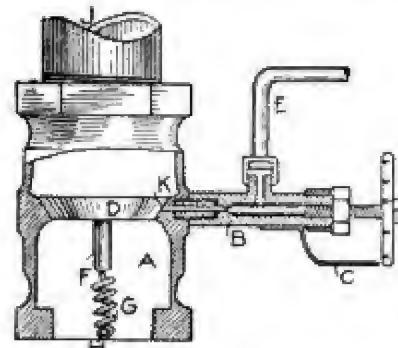
### Oiling a Screw Jack

It is very aggravating to be compelled to relieve a screw jack when it is under a load for oiling, and then to oil it good the screw must be removed. This difficulty may be overcome by cutting a few nicks with a chisel in the body to keep the drill from working over, and drill into the threads as shown in the sketch. Holes  $\frac{1}{8}$  or  $\frac{3}{16}$  in. in diameter are large enough. The jack can be oiled under load and without removing the screw.



### Mixing Valve for Gasoline Engine

The gas-engine mixing valve described herewith was made at short notice from a vertical check valve and a part of an old gasoline stove, when a new valve could not otherwise have been obtained in less than a week.



At a point opposite the seat of a 1-in. vertical check valve was drilled a  $\frac{1}{8}$ -in. hole about half way through the thickness of the material. A similar hole was then drilled in the end of the valve part of the gasoline stove, both holes tapped, and a small brass plug screwed in to connect these parts and sweated in with solder, as shown in the sketch. The needle valve B having been removed, a small hole about the diameter of a large pin was drilled clear through to pierce the check-valve seat at K.

The spindle of the check valve was then drilled to hold the end of a small spring G, at F, the spring being secured in position with a drop of solder. The other end of the spring was bent around a pin, H, which was fastened in the walls at the bottom of the check valve. An indicator C was made of wire and soldered in position to register against the file marks on the small hand wheel, shown to the extreme right, to indicate the position of the needle valve B, and thus show the amount of gas passing to the engine. At the upper end of the check valve was attached the admission pipe J. The gasoline pipe is shown at E, this being in the same position as when used on the stove.

The mixing valve, as described, has been operating perfectly ever since it was made and installed. The suction of the engine causes the valve D to lift, and induces a flow of air through A and a spray of gasoline through K. If thought advisable, however, an air-

regulating device could be attached at the bottom of the check-valve part.—Contributed by J. N. Bagley, Webber, Kansas.

### A Home-Made Marking Pen

A marking pen can be made of a piece of wood and two pieces of clock spring. The wood, which is to be used for the handle should be  $\frac{1}{4}$  in. thick, as wide as desired, and 6 in. long. Procure two pieces of old clock spring and attach them to the wood with linen thread, allowing 1 in. of each spring to project, as shown in the sketch. The springs should be placed on the wood with the curve inside so as to bring the extending ends closely together. The contact of the two springs should be even to make the ink flow the full

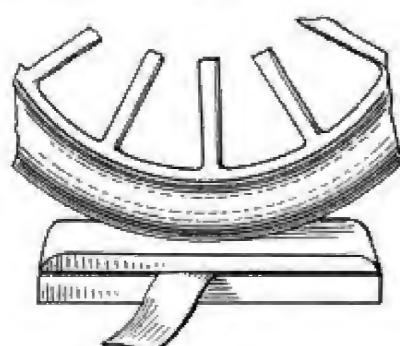


Springs Tied to the Handle

width in a smooth broad line.—Contributed by Henry C. Wood, Toronto, Canada.

### Applying Pressure on Patched Inner Tubes

The motorist when making a tire repair on the road can apply sufficient pressure on a patch by using two blocks of wood as shown in the sketch. The blocks can be carried in the tool box.



They should be shaped for the tires, about 5 in. wide and 9 in. long, with a curve cut in the one used on top. The inner tube with the patch in place is put between the blocks and one of the inflated wheels on the car rolled on to it.—Contributed by Edwin Marshall, Oak Park, Ill.



## A Guitar That Is Easy to Make

A guitar having straight lines, giving it an old-fashioned appearance, can be made by the home mechanic, and if care is taken in selecting the material, and having it thoroughly seasoned, the finished instrument will have a fine tone. The sides, ends and bottom are made of hard wood, preferably hard maple, and the top should be made of a thoroughly seasoned piece of soft pine. The dimensioned pieces required are as follows:

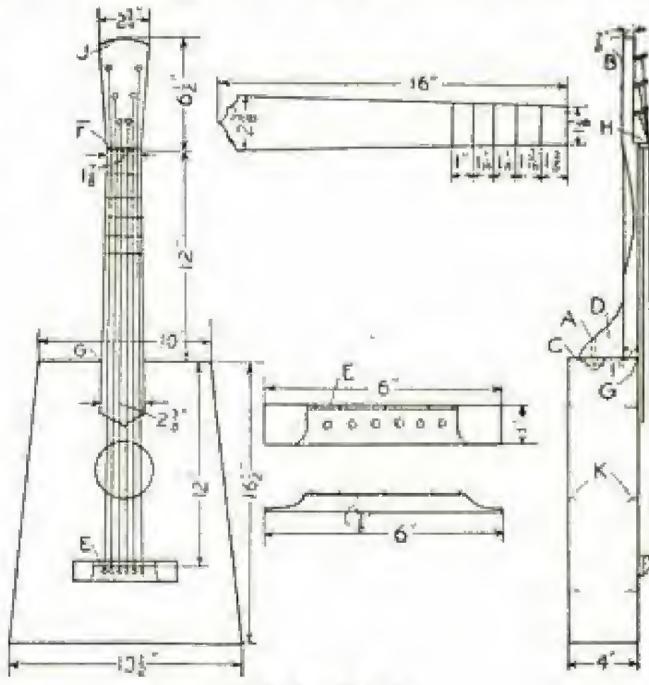
- 1 Top,  $\frac{1}{8}$  by 14 by 17 in.
- 1 Bottom,  $\frac{1}{8}$  by 14 by 17 in.
- 2 Sides,  $\frac{1}{8}$  by  $3\frac{1}{2}$  by  $16\frac{1}{4}$  in.
- 1 End,  $\frac{1}{8}$  by  $3\frac{1}{2}$  by  $13\frac{1}{2}$  in.
- 1 End,  $\frac{1}{8}$  by  $3\frac{1}{2}$  by  $9\frac{1}{2}$  in.
- 1 Neck, 1 by  $2\frac{1}{8}$  by  $18\frac{1}{2}$  in.
- 1 Fingerboard,  $\frac{1}{8}$  by  $2\frac{1}{8}$  by 16 in.

Cut the fingerboard tapering and fasten pieces cut from hatpins with small wire staples for frets. All dimensions for cutting and setting are shown in the sketch. The neck is cut tapering from G to F and from J to F, with the back side rounding. A draw-knife is the proper tool for shaping the neck. Cut a piece of hard wood,  $\frac{1}{4}$  in. square and  $1\frac{1}{8}$  in. long, and glue it to the neck at F. Glue the fingerboard to the neck and hold it secure with clamps while the glue sets.

The brace at D is 1 in. thick, cut to any shape desired. The sides are glued together and then the front is glued on them. Place some heavy weights on top and give the glue time to dry. Fasten pieces of soft wood in the corners for braces. Glue the neck to the box, making it secure by the addition of a carriage bolt at A. A small block C is glued to the end to reinforce it for the bolt. Glue strips

of soft wood, as shown by K, across the front and back to strengthen them. The back is then glued on and the outside smoothed with sandpaper.

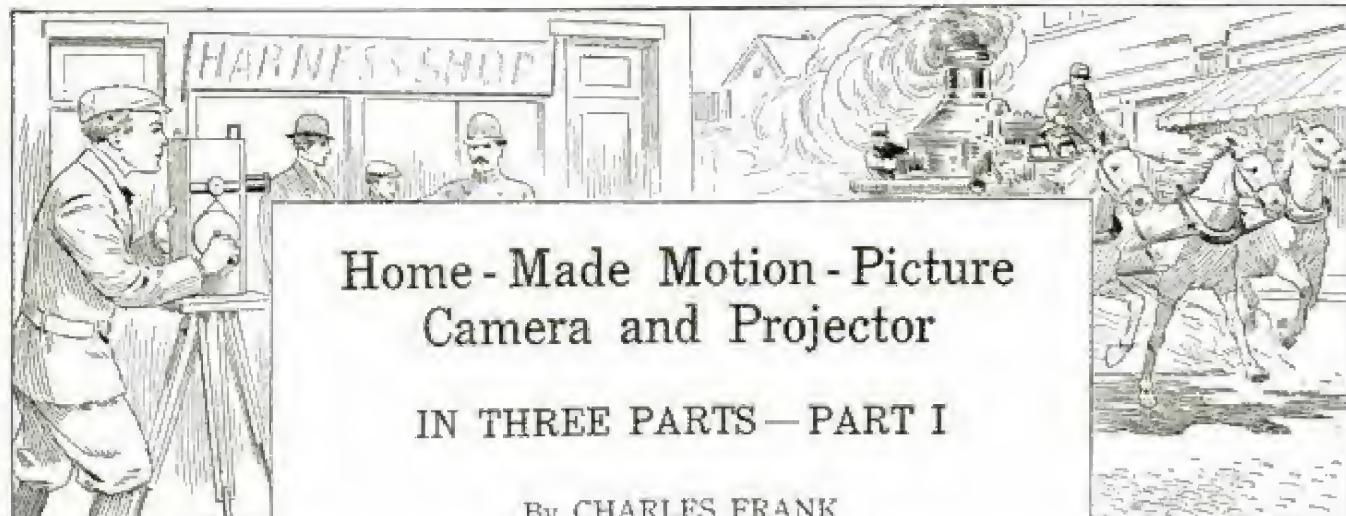
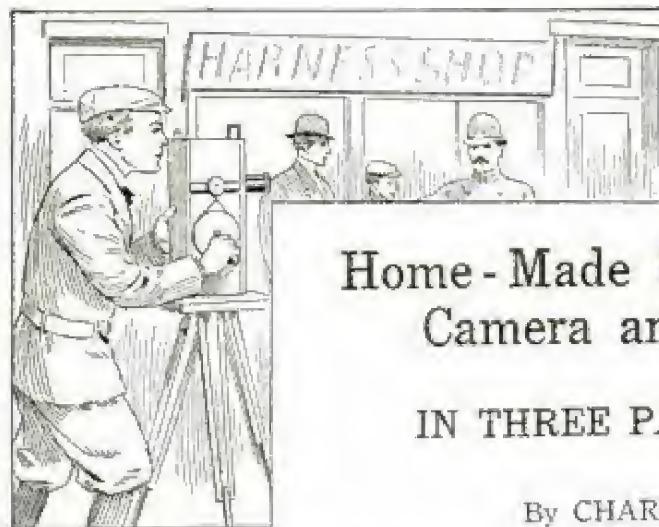
Make the bottom bridge by using an old hatpin or wire of the same size



Details of Guitar

for E secured with pin staples. Glue the bridge on the top at a place that will make the distance from the bridge F to the bottom bridge E just 24 in. This dimension and those for the frets should be made accurately. Six holes,  $\frac{1}{8}$  in. in diameter, are drilled in the bottom bridge for pins. The turning plugs B and strings can be purchased at any music store.—Contributed by J. H. Stoddard, Carbondale, Pa.

**M**old on wallpaper can be removed at once by applying a solution of 1 part salicylic acid in 4 parts of 95-percent alcohol.



## Home-Made Motion-Picture Camera and Projector

IN THREE PARTS—PART I

By CHARLES FRANK

Motion pictures are made and reproduced by means of a camera and projector, each having a similar mechanism that would seem entirely too complicated for the average person to construct at home, yet a correspondent of the Nickelodeon has devised a simple rotary cylinder shutter that can be substituted for the complicated parts.

While this simple cylinder shutter is not claimed to be non-infringing

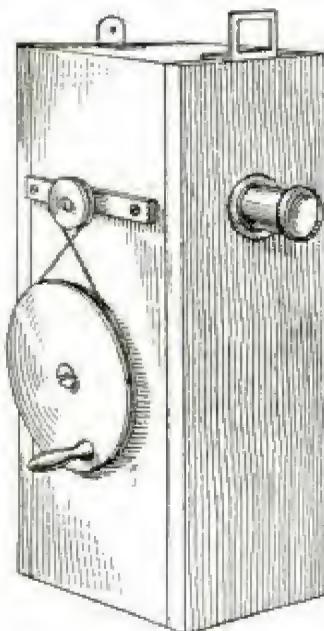


Fig. 1

on existing patents, yet, as it has no commercial value, there would be no objection on this score. The instruments described are nothing more than toys, and if the amateur photographer can secure a few dozen feet of animated photographs about the home that are dear to his heart, and reproduce them on a screen, it will have served its purpose. The camera and projector described uses standard film,  $1\frac{3}{8}$  in. wide, with perforations every  $\frac{1}{16}$  in.

### The Camera

The ordinary hand camera for making still pictures consists of a light-

tight box with a lens at one end and a sensitized plate or film at the other. The motion-picture camera (Fig. 1) is nothing more than a hand camera with a mechanical device for stepping a long roll of film through a space in the focal plane of the lens at a speed of about 16 pictures a second, and stopping the film long enough to make the requisite exposure on each division. The first thing to consider is the lens. A lens having ordinary speed for a hand camera, and one with about 3-in. focal length will give satisfactory results. If one does not care to purchase a lens, a small  $1\frac{1}{2}$ -in. or 2-in. reading glass can be used, if it is stopped down, or a lens may be taken from a hand camera. The width of the camera from front to back (W, Fig. 2) must be determined by the focal length of the lens. The dimensions given in the drawing are only approximate, and they can be changed if the camera is to be used in making an extra long film negative.

The roll of unexposed film (A, Fig. 2) is placed on a small shaft between U-shaped bearings, made of sheet metal and screwed to the top board of the camera. The lens B is set in the front board at a point 4 in. below the top. If a large roll of film is to be used, this distance must be greater to allow room for the film roll in the top of the camera. The cylinder C, which acts as a shutter and intermittent movement, revolves directly behind and in the path of the light passing through the lens. Partitions, DD, are set in grooves cut

in the boards, forming the sides of the camera. These partitions are to keep the light, which may be diffused from the lens, from striking the film at either side of the shutter, and at the same time acting as guides for the film at the rear end of the camera. Their edges at the back are covered with black velvet. The back of the box is a hinged door, rabbeted on all edges, and opening at the side to allow the insertion and removal of the film, and also acting as a guide for the film when closed. A strip of black velvet, E, a little wider than the film, is pasted to the inside surface of the door, so that it bears lightly against the back edges of the partitions DD. The film passes between the edges of the partitions and the velvet on the door with some friction, which keeps it from moving except when pulled through with the roller shutter. A wire-staple guide, F, is fastened in the lower partition, through which the end of the film is passed before closing the door. The film as it is run through drops in folds in the bottom of the box.

The rotary cylinder shutter is the heart of the machine and should be made well and strictly according to the dimensions. The detail of this part is shown in Fig. 3. A rectangular opening is mortised through one of its diameters to admit light on the film when in certain positions. The cylinder is of wood with a  $\frac{1}{4}$ -in. steel rod inserted in the center of each end for axles. A small grooved pulley (G, Fig. 2), about 1 in. in diameter, is fastened to the outer end of one of these rods. The cylinder is revolved by a round belt from a drive wheel, H, 3 or  $3\frac{1}{2}$  in. in diameter and turned by the aid of a crankpin. Owing to the backward rotation of the cylinder, the belt must be crossed between the drive wheel H, and the pulley G. The projections or sprockets, Fig. 3, must be accurately set at a distance of  $\frac{3}{8}$  in. from the 90-deg. point, using the center of the mortised hole as a base. These projections can be pins or small staples, but they must not be over  $\frac{1}{16}$  in. in size. The base of the sprockets must fit the

hole in the film snugly, but the points should be slightly rounding, so that they will easily enter the perforations. When the upper sprocket, which is approaching the film, engages a perfora-

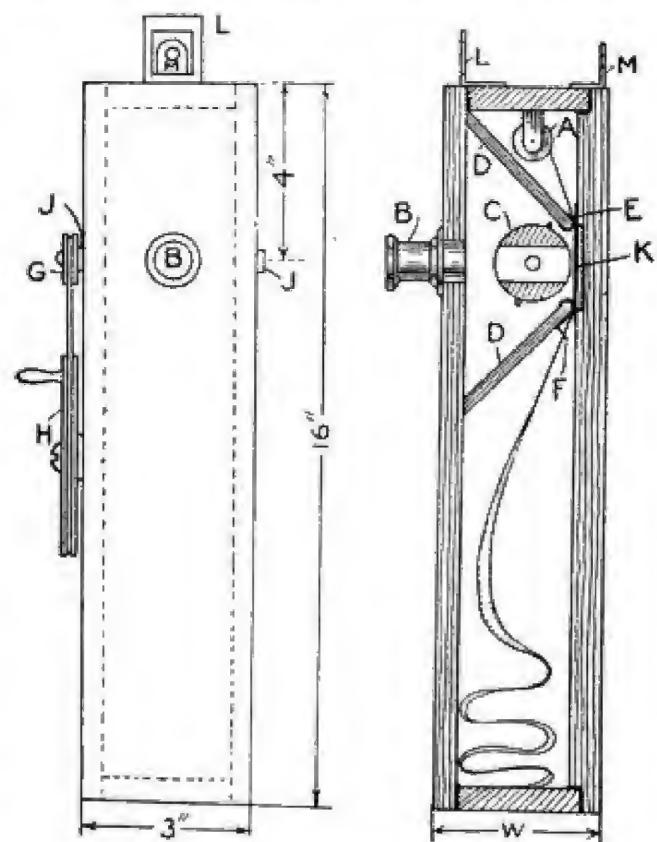


Fig. 2—Details of Camera

tion, just below the upper partition, it will carry the film downward until the sprocket disengages from the perforation at the lower partition. The distance of travel must be exactly  $\frac{3}{4}$  in., as that is the height of each picture. The cylinder requires some adjustment to meet this condition; therefore the axles are made to revolve in holes bored in two strips of wood, JJ, which can be moved forward or backward to obtain the proper distance from the film. To allow for this movement, the axles pass through slots cut in the sides of the camera box instead of round holes. The strips JJ are fastened temporarily and when the correct position for the cylinder is found, they are permanently fastened to the box. Grooves, K, are cut through the black velvet and into the back of the door to allow a space for the sprockets to pass through freely. The inside of the box should be painted a dead black, and black paper pasted on all corners and joints. Black velvet

is pasted in the rabbet of the door to insure a light-tight joint when the door is closed. The cylinder shutter is also painted a dead black inside and out.

The cylinder in revolving exposes the

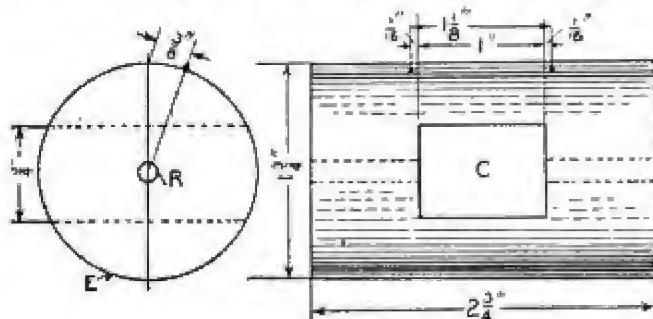


Fig. 3—Details of Shutter

film immediately behind it through the mortised hole. The sprockets or cylinder does not touch the film while the exposure is being made, but as the hole turns toward a perpendicular position, the sprockets catch the perforations of the film and it moves down  $\frac{3}{4}$  in. Just as soon as the sprockets disengage the film, the shutter exposes the next sec-

tion of film, and so on as rapidly as the cylinder is turned, but the average should be about 16 pictures per second.

A view finder must be supplied so the field covered by the lens can be determined. Such a finder is made of two pieces of metal, L and M, bent L-shaped and fastened to the top of the camera box. One of the pieces (L) has a rectangular opening 1 in. wide and  $\frac{3}{4}$  in. high, and the other (M) is drilled with a  $\frac{1}{8}$ -in. drill, the distance between the two pieces being the focal length of the lens. One eye applied to the  $\frac{1}{8}$ -in. hole in the piece M will see through the rectangular hole in the piece L about the same field as covered by the lens. The pieces should be accurately placed and fastened on the box when the camera is set, so that the lens will throw the same portion of the picture on the space where the film passes as will be seen through the finder.

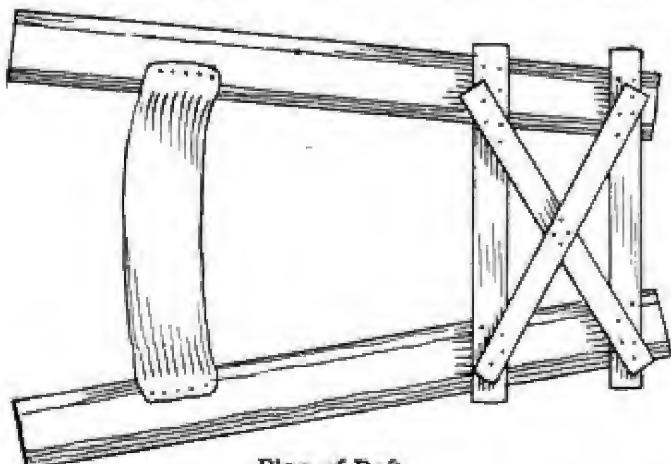
(To be continued)

### A Swimming Raft

Swimming is learned only by experience and to get this experience one must not be afraid to trust himself in the water. This is sometimes accomplished by the use of a swimming raft or water wings. As the water wings need to be inflated frequently, I made a swimming raft instead, in the fol-

a piece of burlap or other strong material was nailed across the center with slack enough for it to be partially submerged.

The middle of the band, its depth, etc., can be adjusted to suit the user. Be sure to remove all the roughness of the logs and boards with a rasp and sandpaper.—Contributed by W. P. Johnston, Sumner, Ill.



Plan of Raft

lowing manner: Two logs, about 6 or 7 ft. long and about 8 in. in diameter, were fastened together with large nails, as shown in the illustration, and

### Removing Finger Marks on Books

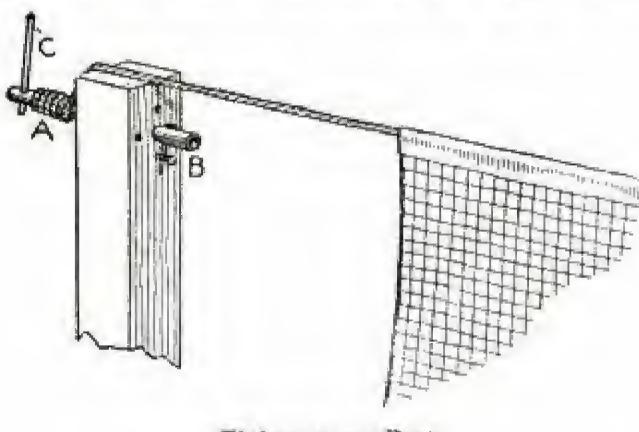
Dampen a piece of wash leather and use it to rub pumice on the spot to be cleaned. Brush off the pumice and rub again with a piece of dry wash leather.

### Tightening a Tennis Net

Anyone who has ever played tennis will readily see the advantage of the net-tightening device shown, in preference to the old method of pulling the net tight by hand. All that is necessary to make the device is 1 ft. of or-

dinary gas or water pipe, 8 or 10 in. of  $\frac{1}{2}$ -in. iron bar, and two twenty-penny nails. The posts generally used are 6 by 6 in. About 4 in. from the top of the post bore a 1-in. hole, parallel with the direction the rope is to run. On the inside surface of the post bore four  $\frac{1}{4}$ -in. holes.

Drill a  $\frac{1}{2}$ -in. hole 1 in. from one end of the pipe, and a  $\frac{1}{4}$ -in. hole 1 in. from the other end. Put the iron bar in the  $\frac{1}{2}$ -in. hole, tie the rope around the pipe and bar at A and wind. With the leverage of the iron bar one can readily pull the net to any desired tightness. After the net is drawn in position, put one of the nails through the  $\frac{1}{4}$ -in. hole



Tightener on Post

in the pipe and the other in one of the  $\frac{1}{4}$ -in. holes in the post.—Contributed by Wm. S. Looper, Gainesville, Ga.

#### Holding Fishing-Rod Joints Together

The addition of two or three screw-eyes properly placed in a jointed fishing rod of the ordinary type will prove decidedly worth while, as the joints will often pull out easily when they should not and stick tightly when they should pull apart.

Assemble the rod and bore small holes through the brass sockets into the joints as shown in Fig. 1 and place some screweyes into the holes. Mark the joints so that the holes in the joints and holes in the brass sockets will always be in the same position.

The screweyes prevent the joints from pulling out when an effort is made to free the line from some object in which it has become entangled. They

also act as guides for the line. Should the joints fit too tightly, scrape the ends until they slip easily into the sock-

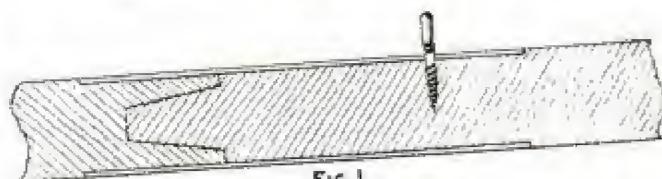


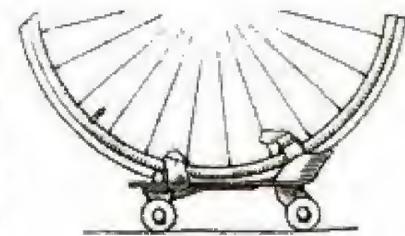
FIG. 1

FIG. 2  
Screweye in Joint

ets, as the screweyes will hold them properly, even if they fit a little loose after the scraping.

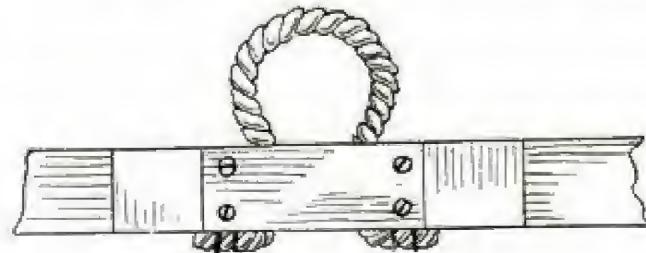
#### Roller Skate on a Bicycle Wheel

When the front tire on a bicycle will not hold and needs to be taken to a repair shop, strap or tie a roller skate to the rim of the wheel, as shown, and no trouble will be experienced in wheeling or riding the bicycle to the shop.—Contributed by K. Chase Winslow, Elizabeth, N. J.



#### Rope Oarlocks

Having considerable trouble because of breaking of oarlocks, I devised a successful way by which the difficulty was

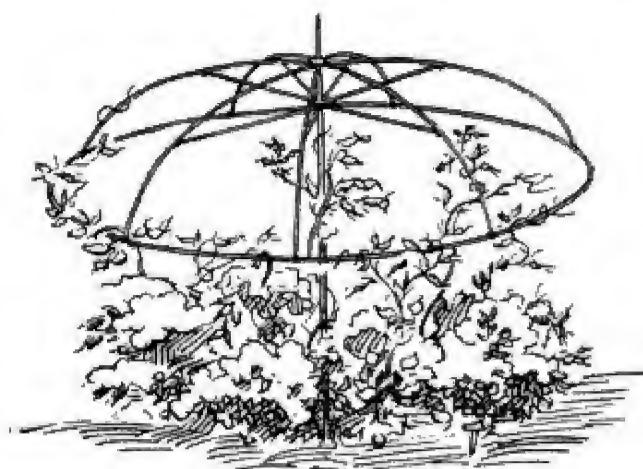


Piece of Rope in Place

overcome. The device is extremely simple and is nothing more than a piece of rope fastened to the gunwale as shown in the sketch.—Contributed by Arthur L. Chetlain, Rogers Park, Illinois.

### Umbrella Used as a Flower Trellis

Procure a discarded umbrella and remove the cloth, leaving only the steel frame. Join the ends of the ribs by

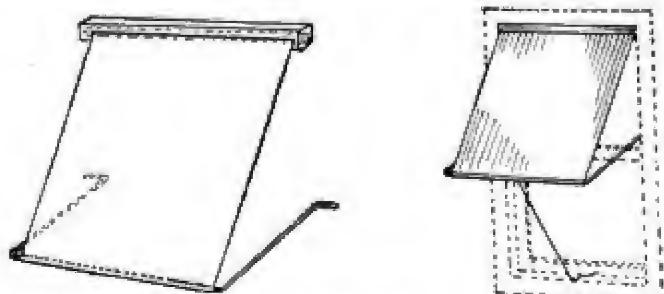


Frame Supporting a Vine

running a fine wire through the tip of each rib and giving it one turn around to hold them at equal distances apart. The handle is then inserted in the ground and some climbing vine planted beneath it. The plant will climb all over the steel frame and make a very attractive lawn piece.—Contributed by John F. Campbell, N. Somerville, Massachusetts.

### Combined Shade and Awning

An ordinary window shade makes a good awning as well as a shade, if it is attached to the outside of the window with the device shown in the illustration. The shade and spring roller are put into a box for protection from the weather and the box is fastened in the window casing at the top.



Shade Attachments

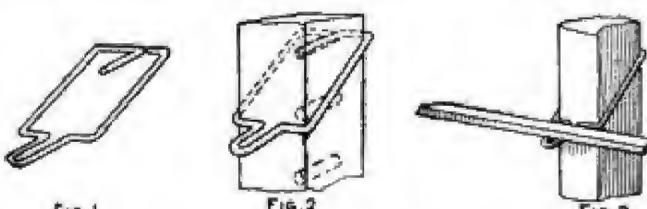
A narrow slit on the under side of the box permits the shade to be drawn out. The stick at the end is removed and a

U-shaped wire inserted in the hem in its stead. The wire is bent so the ends may be inserted in holes in the window casing. As the shade is drawn out, it is extended outward by the wire in the position of an awning.—Contributed by Arthur Kesl, Chicago, Ill.

### Vaulting-Pole Attachments

Some means must be provided on vaulting-pole standards to allow for the free release of the pole should the vaulter strike it in going over. One of the simplest of the many devices that can be used for this purpose is shown in Fig. 1. It is made of heavy wire, bent and slipped over the standard as shown in Fig. 2. The projection on the inside of the link is used similar to the tongue of a buckle in adjusting the height of the pole on the standards.

Each standard has a series of holes on its front side. These holes may be numbered for convenience. The pole



Pole Adjuster on Standard

in place is shown in Fig. 3.—Contributed by John Dunlap, Craghead, Tollcross, England.

### Separating Drinking Glasses

When two thin glasses are put one into the other they often become stuck and cannot be removed. To separate them with ease, set the lower glass in warm (not hot) water and pour cold water in the upper one. The expansion of the lower and the contraction of the upper will make release an easy matter.—Contributed by Maurice Bauvier, New Orleans, La.

Bronze striping, when thoroughly dry, should be covered with a thin coat of white shellac to keep it from tarnishing.

## Wood-Working for Beginners

Making a Table — Typical Form for the Method of Laying Out and Making a Glue Joint — Pinned and Closed Mortise-and-Tenon

By IRA S. GRIFFITH

### CHAPTER XV

In Fig. 101 is shown the perspective of a table which contains a glue joint, closed mortise-and-tenon, and a pinned mortise-and-tenon joint. By means of the working drawing, Fig. 102, make out a stock bill and order the necessary lumber. The lumber for the top is to be cut in several pieces.

The top may be built up first and the glue allowed to dry while the other parts are being made. If the boards are rough, one side should be planed up for a face side. Before jointing the edges, take a look at the ends of the pieces as well as the surfaces. Lay out the pieces the way they are to be fitted to one another and mark them so that this order can be maintained hereafter. The annual rings should be fitted as in Fig. 103. If this is done, any warpage in one piece will tend to equalize that of its neighbor so that the general surface of the top will be level. Again, so plan the fitted parts that the surface grain

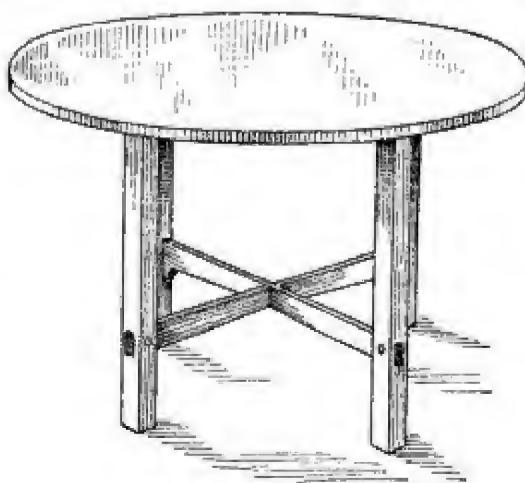


Fig. 101 — The Table

may all run in the same direction. If this is not done, it will not be possible to plane the surfaces over the joints without roughing up the wood from one direction or the other.

Place two pieces in the vise, Fig. 104, face sides together, and plane the edges

until you think they are straight and level, no try-square test is necessary. Use a jointer and make sure the plane iron is ground straight across.

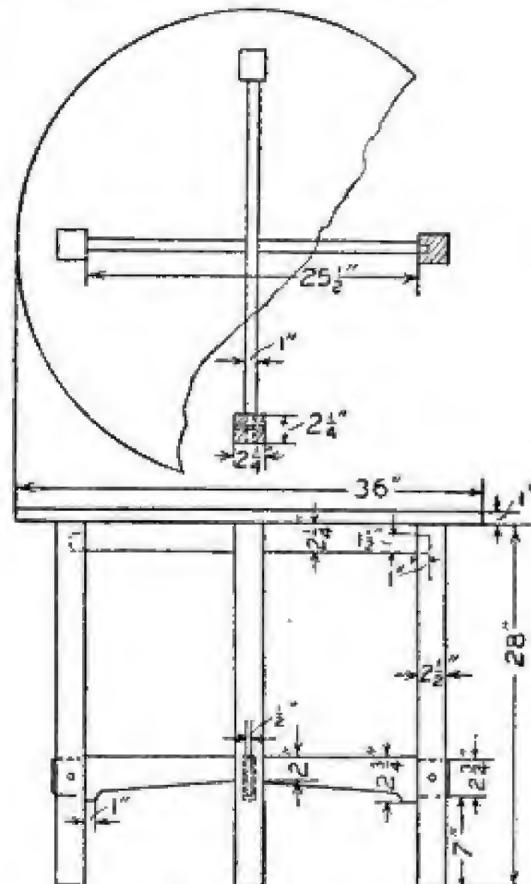


Fig. 102 — Table Details

Separate the pieces and, keeping one in the vise, set the other on this, both face sides on the same side of the work. Look at the joint to see whether any light can be seen through it. Also slide the top board endwise to feel for suction. Tap the lower board lightly to see if the upper will rock. Finally test as shown in Fig. 105 to see whether the face sides lie in the same plane or not. Plane until you get a good joint, for a poor glue joint is no joint at all.

When a surface of contact has been obtained that extends the whole length of the edges, and the face sides lie in the same plane, the clamps are to be gotten ready and the glue heated preparatory to gluing the joints. Fig-

ure 106 shows the manner of applying the glue to the edges. Figure 107 shows the boards in the clamps. Before applying the glue, have everything in readiness, the wood warmed, if possible, so that it will not chill the glue, in order that no time may be lost be-

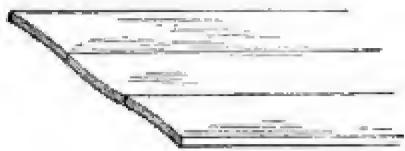


Fig. 103

tween applying the glue and the clamping.

When the glue has hardened, which usually takes 24 hours, the clamps are to be removed and the pieces surfaced and treated as one. Sometimes dowels are used between glue joints. Many mill-men, however, do not consider them necessary.

The mortises and their tenons may be made next. The tenons on the upper stretchers are to be 1 in. long so that the full length of each piece will

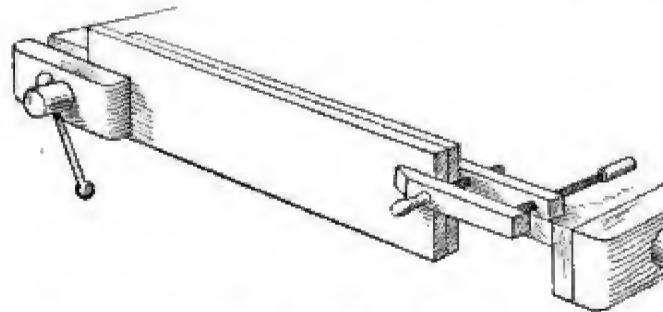


Fig. 104 — Clamping Face Sides of Boards Together

be  $2\frac{1}{2}$  in. They are to be shouldered on three sides. Tenons may be shouldered on one, two, three or four sides. The reason for shouldering these on three sides and making one of these shoulders so large is to prevent any danger of splitting out the ends of the legs.

The important thing in laying out mortises and tenons is to keep the head of the gauge always against the face side or the face edge and to make as much use of the tool you hold in your hand as is possible before laying it down to take up another. As an illustration, the tenons of the upper stretchers are  $\frac{1}{2}$  in. thick. This leaves  $\frac{1}{4}$  in. on either side. The amateur always

wants to gauge both of these sides with the same setting of the gauge,  $\frac{1}{4}$  in. This is contrary to trade practice, for, while it saves resetting the gauge, it makes the thickness of the tenons dependent upon the thickness of the stock. The correct way is to set the gauge to  $\frac{1}{4}$  in. and gauge all the tenons for this setting, holding the head of the gauge against the face side, then reset to  $\frac{1}{4}$  in., plus the thickness of the tenon,  $\frac{1}{2}$  in., which makes  $\frac{3}{4}$  in. Again hold the head of the gauge

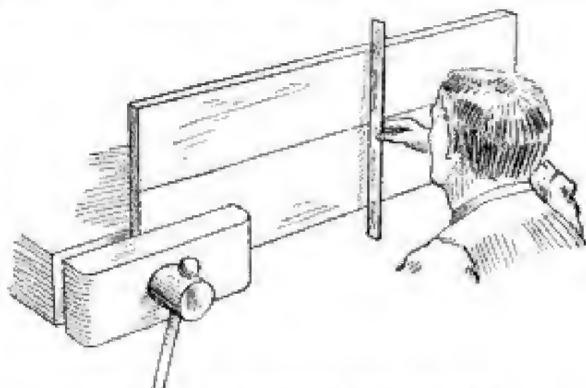


Fig. 105 — Testing for Flat Surface

against the face side. In this way all the tenons will be  $\frac{1}{2}$  in. thick, no matter how much the pieces may vary in thickness. This same principle applies to gauging the mortises.

In laying off the shoulders and tenon lengths, place the pieces in the vise or clamp them together on the bench with the face edges up. The face edge of the upper stretchers is to be the lower edge of the piece and on the lower stretchers the upper edge.

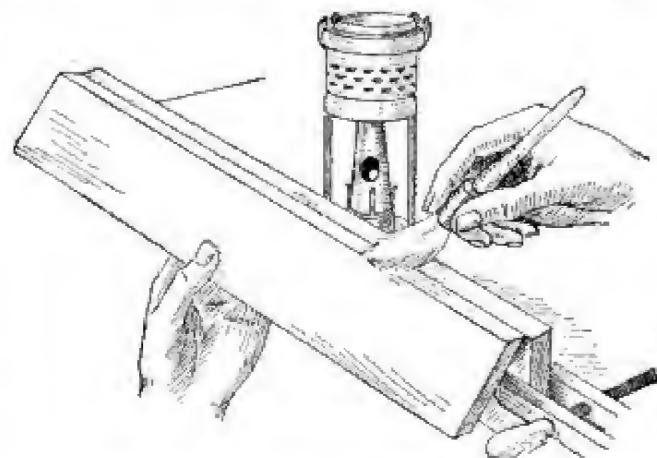


Fig. 106 — Applying Glue to the Edges

Measure from the centers of the stretchers toward the ends one-half

the distance called for. Measure on out toward the ends from these lines the length of the tenon. Mark these places with a knife, and with try-square place knife lines across the edges of all the pieces. Separate the pieces and with knife and try-square carry these lines entirely around the pieces, observing the rule about keeping the beam of the try-square against only the face side or face edge.

Observing the cautions given above, gauge the pieces on the surfaces and edges as far back as the shoulder lines just made and across the ends.

Using the tenon saw or back-saw first, rip carefully to the gauge lines, keeping the kerf on the waste, but leaving no wood between it and the

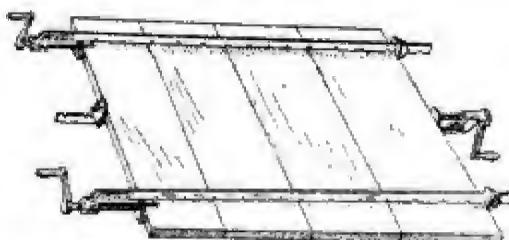


Fig. 107—Boards in Clamps

line. Second, crosscut to the knife lines that indicate the shoulders, Fig. 108.

The mortises are to be made next. Place the legs on the bench, face sides up, and measure off the locations of the ends of the mortises. The face sides are to be turned in and the mortises are to be worked in them because they are more likely to be accurate than are the other sides, the shoulders are more likely to fit up snugly against them. Separate the legs and carry the lower lines entirely around. It will be well to use a sharp-pointed lead pencil in marking around the legs for the lower mortises. These mortises extend entirely through the legs so that the lines have to be carried all around the legs and were knife lines used, they would show badly on the finished piece. Keeping the gauge head against the faces, gauge the sides of the mortises. Gauge all the mortises first at  $\frac{7}{8}$  in., then at  $1\frac{3}{8}$  in. The ends of the mortises which were penciled may

now be knifed between the gauge lines to facilitate setting the chisel. Use the try-square with the knife.

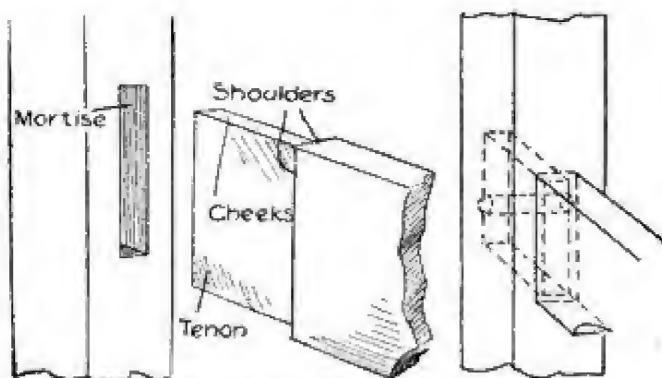


Fig. 108—A Tenon-and-Mortise Joint

In laying off for gauge settings, instead of measuring directly for them, the rule is placed as in Fig. 97 of Chapter XIV. The measuring is done from the center of the piece each way. Afterward, the spur is set in these knife point marks and the head pushed up against the face and the screw set.

There are two ways of cutting a mortise that are common. One way, which is especially advantageous in large mortises, is to bore a series of connected holes very nearly the entire length of the mortise. If the mortise is closed, as are the upper mortises in the legs of this table, the holes must be of uniform depth and correct. Figure 109 shows a simple device for obtaining uniform and correct depth. The block is to be sawed off to the length required by the depth of the mortise and the length of the bit. This can be determined by turning in the

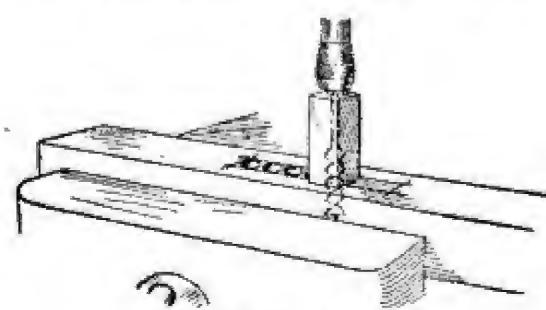


Fig. 109—Depth Gauge

spur until the lips are ready to cut, then measuring the length of the bit up to the jaw. Subtract from this the depth of the hole and the length of the block is known. Beginning at the center, pare off thin slices of wood un-

til the gauge and knife lines are reached. The sides of the mortise must be cut down plumb or the tenon cannot fit. In the through tenon and mortise the holes must be bored from

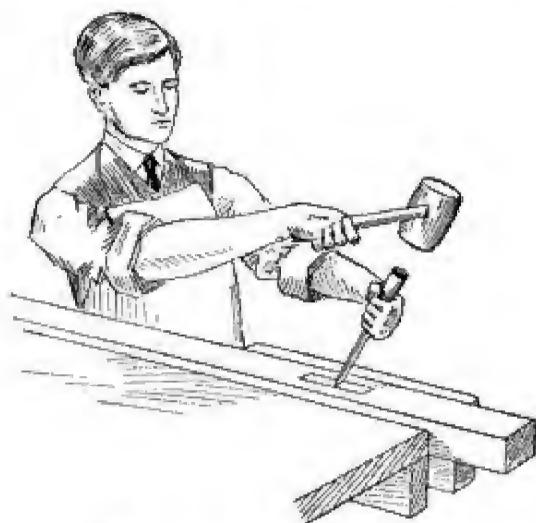


Fig. 110—Cutting a Mortise

each side of the leg and likewise chiseled.

The second method consists in only chiseling the mortise. Use a chisel that is the same width as that of the mortise. Stand so as to be able to look along the length of the mortise and cut out a V-shaped opening the depth of the mortise, Fig. 110. If the mortise is to extend through, cut a little over half way. Next, begin in the center and, with the bevel side of the chisel toward you, take vertical cuts and work gradually toward the other or far end. Cut the full depth of the mortise each time and pull the chisel toward you after each cut before removing it to break the waste from the sides of the mortise.

Cut to within  $\frac{1}{8}$  in. of the end and then reverse the piece and cut out toward the second end. Pry out the chips occasionally. Finally finish the two ends out to the knife line but do not pry on them after these cuts. If the mortise is a through one, cut one side of the leg, then reverse and cut from the second side, being careful that the cutting from the second side shall be plumb. Otherwise there will be danger of the chisel splintering the arrises of the first side. Never allow the chisel edge to be forced beyond two-thirds of the way through.

There remains the boring of the holes for the pins. Lay these out very carefully on the legs with rule, try-square and gauge. Instead of inserting the tenons and boring both mortise sides and tenon at once, lay out the holes on the tenons separately, very carefully. Use the same measurements as for the mortises, except that the center is to be drawn toward the shoulders about  $\frac{1}{32}$  in., strong. This is to insure the pins' pulling the shoulders up snugly to the leg and is called draw-boring. Too much draw-bore would split the tenon, therefore care must be taken to have everything just right.

Use  $\frac{3}{8}$ -in. doweling for pins. Cut them off longer than the leg is wide and point the end so that it can find the way through without splitting off the arrises of the hole at the far side. Use glue and clamps on the upper joints.

The top is to be fastened from the under side of the top stretchers by means of screws.

*(To be continued)*

### How to Mix Plaster of Paris

For the mixing of plaster of Paris for any purpose, add the plaster gradually to the water, instead of the contrary, says the Master Painter. Do not stir it, just sprinkle it in until you have a creamy mass without lumps. Equal parts of plaster and water is approximately the correct proportion.

The addition of a little vinegar or glue water will retard the setting of the plaster, but will not preserve its hardening. Marshmallow powder also retards the setting. In this way the plaster may be handled a long time without getting hard. If you wish the plaster to set extra hard, then add a little sulphate of potash, or powdered alum.

### Floor Push Button

An ordinary electric push button can be used for a floor push button by placing it on a bracket or shelf attached to a joist, as shown, and using a nail for the extension push. A  $\frac{1}{4}$ -in. hole is bored through the floor, also through a small piece of wood fastened beneath the floor, at the right place to direct the nail so that it will strike directly upon the small black knob of the push button. The nail



**Push Button on Joist**

should be just long enough to rest lightly on the knob.—Contributed by Reginald R. Insole, Hamilton, Can.

### A Wrist Brace

To strengthen a weak wrist, take a piece of leather, preferably white oak tanned, 2 in. wide and 14 in. long, and carefully shave it down with a sharp knife, until it is  $\frac{1}{16}$  in. thick. Then cut it as shown in Fig. 1, the wide part or body being 7 in. long, and the narrow part or neck, 6 in. long and 1 in. wide. Cut a semicircular hole, 1 in. from the extreme end of the body,  $\frac{1}{2}$  in. wide and  $1\frac{1}{4}$  in. long, to allow the neck to slip through, then punch three holes in each end and lace with rawhide or shoestring, or, better still, if you happen to have a small buckle, sew it neatly to the body. It looks better



**FIG. 1**

**Brace Made of Leather**

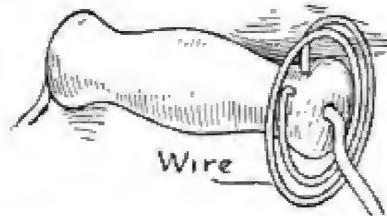


**FIG. 2**

and saves time in adjusting. When complete and on the wrist, it will appear as in Fig. 2.—Contributed by J. H. Harris, Berkeley, Cal.

### Protecting a Kettle Handle from Heat

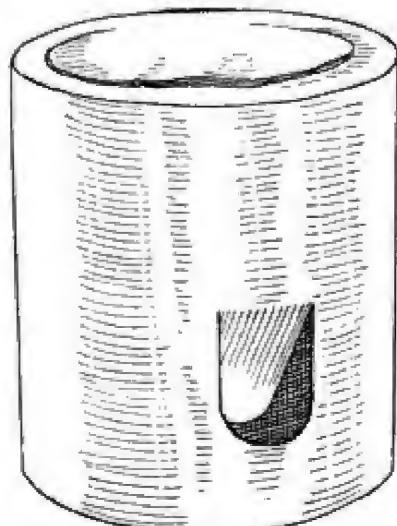
The wood handle of a kettle or cooking utensil when not in use usually comes in contact with the side of the vessel and it will absorb enough heat each time to finally char and crack the wood.



The heat of the handle at times is so intense that it often results in a burned hand. The spiral metal handle provides a way for cooling by exposing a considerable surface to the air, yet the metal retains the heat so that many times it is too hot to handle. If a wood handle is provided with a coil of wire as shown in the accompanying sketch, the wood cannot come in contact with the side of the heated vessel and the air encircling the wood prevents it from getting too hot to handle. The spiral can be attached to a metal handle with solder.

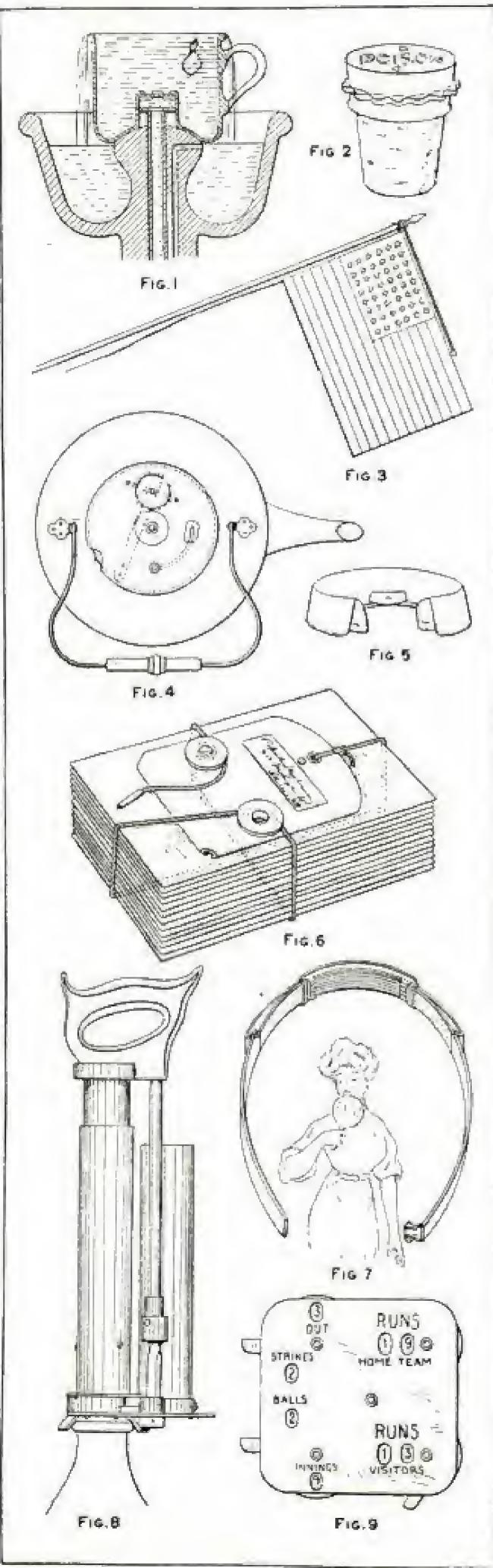
### Tin Can Used for Watering Chickens

An ordinary discarded tomato can makes a good watering vessel for young chickens. Care must be taken in opening the can to cut the tin so the cover will hinge. Cut the tin about  $1\frac{1}{2}$  in. from the bottom so that it will form a U-shaped piece as shown in the



sketch and push the hanging portion in the can. Fill the can up to the opening with water, close the cover and set it in the coop.—Contributed by L. Alberta Norrell, Augusta, Ga.

## INTERESTING PATENTS



**SANITARY DRINKING FOUNTAIN**—A drinking fountain, the cup of which may be lifted to the lips but when not in actual use has water continually flowing over its rim, is shown in Fig. 1. The fountain has a convex head with a supply pipe projecting from it, and upon this the cup is seated. The cup has a concave bottom provided with a central tubular upwardly projecting valve casing adapted to receive the supply pipe. In the casing is a check valve. When the cup is on the fountain head, the water enters and overflows, and when the cup is removed by the drinker, it retains the water in it.

\* \* \*

**POISON-BOTTLE CORK**—The danger of mistaking a bottle of poison for some harmless drug when groping in the dark is made practically impossible by a poison top of the type shown in Fig. 2. It is a metal cap provided with a stopper-engaging flange, which is outwardly flared and crimped to provide regularly spaced flat projections. In drawing the cork, the fingers cannot help but come in contact with the projections, and this draws attention to the nature of the contents.

\* \* \*

**FLAGPOLE ATTACHMENT**—To persons who object to flags drooping when the air is still, this little device (Fig. 3) may be found useful when flags are flown on a pole set at an angle. It comprises a rod having its inner end formed into a coil to encircle the flagpole and its outer end adapted to secure the flag. The coil or collar is sufficiently loose to allow the rod to rotate about the pole.

\* \* \*

**REVOLVING KETTLE-LID**—Figure 4 shows a kettle provided with a nonremovable lid. The lid is in two parts, one being stationary and the other revolvable. The revolvable lid-member is provided with an inlet opening which registers with the valve opening in the stationary member when the former is turned to its open position.

\* \* \*

**PERFECT TIE-SLIP COLLAR**—Instead of the hole for the back collar button being in the neckband of this turn-down collar (Fig. 5), it is in a tab attached as shown. This leaves an unobstructed tie-space in which the tie can easily be slid back and forth in the process of tying, and gives a lateral movement that allows the collar to adjust itself to the neck and shirtband.

\* \* \*

**COMBINED TYING DEVICE AND LABEL HOLDER**—Figure 6 is a handy combined label holder and package tie, the method of application of which is clearly shown in the drawing.

\* \* \*

**WAIST-RETAINING DEVICE**—The perverse inclination of a waist to creep up in the back and bulge out when held only by an ordinary belt may be prevented by using a belt of the kind shown in Fig. 7. The friction member designed to hold the waist in place is provided with a number of inwardly facing projections, which the inventor believes will restrain the climbing movement without harming the fabric.

\* \* \*

**MACHINE FOR CAPPING MILK BOTTLES**—It is claimed that milk bottles may be capped by this machine (Fig. 8) at a speed several times greater than by the ordinary process. The caps are contained in the shorter cylinder, and are fed, one at a time, under the plunger in the capping cylinder.

\* \* \*

**DISK COUNTER FOR BASEBALL GAMES**—An ingenious score keeper or counter for baseball games is shown in Fig. 9. Provision is made for the innings, strikes, balls, number of men out, and the runs made by both sides.

## PRACTICAL OR UNIQUE

**SANITARY DRINKING FOUNTAIN**—The agitation against the public drinking cup has resulted in many schemes for the elimination of the danger of infection from such a source, but none of them is more curious than the idea shown in Fig. 10. Beneath the water faucet is a rotary drum having radially disposed runway channels, above each of which is a cup chained to a ball that rolls back and forth in each channel. Underneath the drum is a receptacle divided into two basins, in one of which is an antiseptic solution and in the other a rinsing solution. The drum is revolved by means of the balls at the end of the chains, and, as the cups are used, they drop first into the antiseptic bath and then are dragged over the separating wall into the rinsing basin.



**STREET FIXTURE FOR ELECTRIC LAMPS**—The operation of the curved street-lamp support is clearly shown in Fig. 11. The electric circuit is automatically cut out when the arm has been moved to a predetermined position.



**A WHIRLING SPARKLER**—The Fourth-of-July pyrotechnic toys known as sparklers have become exceedingly popular because, while harmless, they provide the child with something which produces a shower of sparks. In Fig. 12 is shown a new form. It is loop-shaped, and provided with a handle by which it may be whirled while burning.



**MOVING-PICTURE ADVERTISING CHAIR**—On each arm of this advertising chair (Fig. 13) is a glass-covered space, 4 in. square, under which passes a roll which is covered with advertisements, the reading matter being changed with every rock. The shaft operating the rolls is turned by means of a ratchet, cog, and lever mechanism which engages with the floor during the rocking action of the chair.



**FIRE-SHUTTER CONTROLLER**—A fire-shutter controller by which it is claimed that common swing-shutters may be opened and closed quickly and safely from the outside of a building without impairing their usefulness, is shown in Fig. 14. The mechanism was invented by a lieutenant of the Boston fire department, and is designed simultaneously to close or open from the ground all the shutters that are hung in vertical alignment, as well as to allow any single shutter to be operated from windows on the inside.



**STOPPER EXTRACTOR**—Figure 15 is a cork extractor comprising an impaling screw and a supporting member shaped to rest on the top of the neck of a bottle. The supporting member acts as a fulcrum for the drawing of the cork.



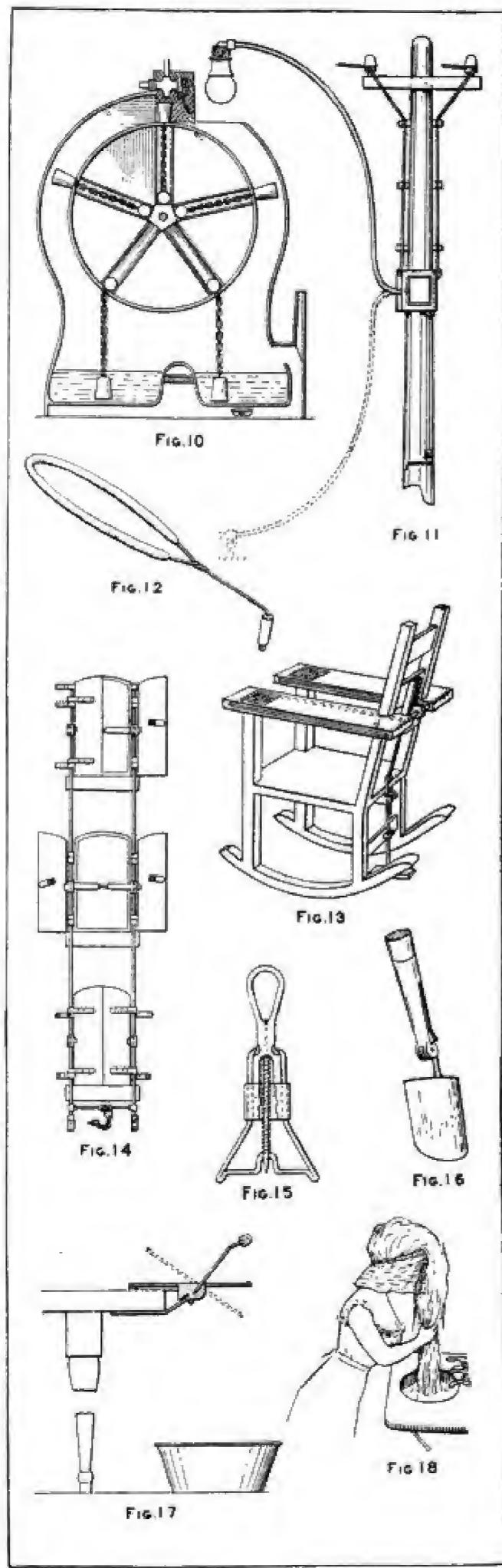
**CONVERTIBLE GARDEN TOOL**—A combination of hoe and spade is shown in Fig. 16. A ratchet between the shank of the blade and the handle permits adjustment in any desired position.



**ANIMAL TRAP**—This method of trapping animals, presumably mice and rats, was patented by an Iowa inventor. Attached to the end of a table top is a wire for the bait and a runway so mounted that it will tip under weight and drop the animal into a tub partially filled with water.



**SHAMPOO CAP**—A protecting cap or shield for use when shampooing the hair is shown in Fig. 18. It passes around the head and forms a protection for the face and neck. In the front is a transparent section through which the user may see.



**T**WO contractors were discussing the methods of building work in New York and Chicago. The contractor from the latter city claimed that they put up buildings much faster there than in New York. "Sure," said the Chicagoan, "they will be digging for the foundation of a 52-story building today and in two weeks it will be finished." "Well, that's nothing to the way they do things here," the New Yorker retorted. "To give you an idea how fast we are let me tell you that the day before yesterday they began building a 20-story apartment on our block and this morning they were dispossessing some of the tenants for being behind with their rent"—Engineering-Contracting.

Little Willie—Say, pa, doesn't it get colder when the thermometer falls?

Pa—Yes, my son.

Little Willie—Well, ours has fallen.

Pa—How far?

Little Willie—About five feet, and when it struck the porch floor it broke.

A French woman, proud of her limited knowledge of English, and an American woman proud of her limited knowledge of French, were introduced at an evening company. The French woman insisted on expressing herself in bad English and the American woman would talk nothing but bad French.

When the guests began to depart they were still at it. At last they arose to go. Here is their watery farewell:

"Reservoir," said the fair American.

"Tanks," responded her new friend.

"Waiter!" called a diner, at a local club, "come here at once! Here's a hook-and-eye in this salad!"

"Yesseh, yesseh," said the waiter, grinning broadly. "Dat's a paht of de dressing, seh!"—

The principal of one of the East Side night schools was enrolling a new pupil, who was tagged out in a suit of clothes so new that it hurt him. Just before the boy came in the principal heard the sound of the fire engines in the street.

"What is your name?" the principal asked the lad.

"Tom Dugan," was the reply.

"Where was the fire, Tommy?" asked the principal as he wrote down the name. There was no reply; only a scowl.

"I say, where was the fire?" repeated the principal.

"Don't git gay wit me," was the somewhat astonishing answer. "Dere wasn't no fire, see? I bought dis here suit and I paid seventy-five cents fer it!"—New York Press.

"It's a hard world," said the aviator who felt that he was not appreciated.

"Yes," replied the colleague. "The world would be much easier for our business if it could have been made of rubber and inflated."—Washington Star.

A motorist who had been scorching on a country road was brought before a justice of the peace, who had fined him before.

"You have been out with that machine again, have you?" demanded the justice. "Frightening horses again, eh? Why don't you get a flying machine if you want to beat time and be eccentric?"

"It would be no good," weakly replied the prisoner. "You would arrest me for frightening the birds."—Royal Magazine.

An Iowa woman who looked into the barn and saw her husband hanging to a cross beam is reported to have exclaimed:

"Land sakes! So that's where my clothesline went to!"—Cleveland Plain Dealer.

"How did Clarence come to get into a disgraceful fight with that camera fiend?"

"Well, you see, Clarence was walking in the park

last Sunday with his fiancee, Miss Fryte. And whenever the lady got in range of the camera, the man would snap it."

"And so Clarence objected?"

"Well, he spoke to the man about it. And the fellow answered that he wasn't taking her picture, but only closing the shutter when she passed, because the lens was too valuable to risk."—Toledo Blade.

\* \* \*

"Have you a spare room in your flat?"

"No; but I stand in with the janitor, and when I have a guest overnight he lets me use the telephone booth."

\* \* \*

O'Hare was a section foreman. He was showing a friend, who had just arrived from the old country, his section. They finally reached a tunnel, and, as they were walking along, a train came rushing by at high speed, passed them and dashed into the tunnel with a great roar.

O'Hare's friend gazed after the train with open mouth and staring eyes.

"Well," said O'Hare, "what do you think of this road? Don't you think I have a well-kept section of track?"

"Yis, indade," said his friend, "but, holy snakes! Just think what an awful calamity it would be if the train should miss the hole!"—Railroad Man's Magazine.

\* \* \*

The motorist emerged from beneath the car and struggled for breath. His helpful friend, holding the oil can, beamed upon him.

"I've just given the cylinder a thorough oiling, Dick, old man," said the helpful friend.

"Cylinder," said the motorist, heatedly, "that wasn't the cylinder; it was my ear!"

\* \* \*

With much trouble the burglar had effected an entrance into the trust company's office. As he approached the big steel safe he was confronted by this sign:

SAVE YOUR DYNAMITE.  
THIS SAFE IS NOT LOCKED.  
TURN KNOB AND OPEN.

"I don't know what their little game is," he said, "but I'll just see if it really is unlocked."

He grasped the knob and gave it a turn.

Whereupon he received an electric shock that nearly floored him, an alarm bell rang loudly, the office became flooded with light, a door in the wall flew open, and a big dog sprang at him.

"Darn my fool hide!" he exclaimed an hour later, as the door of a cell in the police station closed on him; "I know what's the matter with me! I'm too trusting!"—Chicago Tribune.

\* \* \*

"Can you give my constituent here a job on your railroad?" asked the State Senator.

"But he can't talk English."

"Well, give him a job calling trains."

\* \* \*

"You know that fellow, Jim McGoarty, the lad that's always comin' up an' thumpin' ye on th' chist an' yellin' 'How are ye?'"

"I know him."

"I'll bet he's smashed twenty cigars for me—some o' them clear Havannays—but I'll get even with him now."

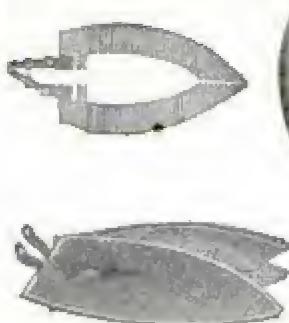
"How will ye do it?"

"I'll tell ye, Jim always hit me over the vest pocket when I carry my cigars. He'll hit me there just once more. There's no cigars in me vest pocket this mornin'. Instead of it there's a stick of dynamite, d'y'e moind?"

\* \* \*

Old man from Missouri (viewing aeroplane for the first time)—"Holy Smokes! if that ain't the queerest-lookin' balloon I ever seen."

Young man (also from Missouri, scornfully)—"Balloon? That ain't no balloon; that's parcels goin' by this noo wireless telegraph."—Judge.



The well-known  
“Calorite”  
heating unit  
with and  
without mica  
insulation.



The  
shell and  
base  
before being  
clamped  
together.

## Transparent Simplicity

### The General Electric Company's Electric Flatiron Lasts a Lifetime

Careful attention to the smallest detail in design and production has resulted in an iron that remains in perfect working order for a generation.

The part that transforms electricity into heat cannot burn out. This unit, insulated by mica and tightly clamped between the two halves of the base, is thus protected from possible injury by two layers of cast iron, each of which is three-eighths of an inch thick. The base is clamped into the shell of the iron so firmly that years of hard service cannot loosen it.

Half a million women use this flatiron that makes ironing a pleasure instead of drudgery. The iron gets “just hot enough” so that it “floats” over the work, leaving the smoothest, glossiest finish imaginable. Every woman realizes how infinitely superior to the old way *electric* ironing is. Every household can have this electric iron that costs only about five cents an hour to operate.

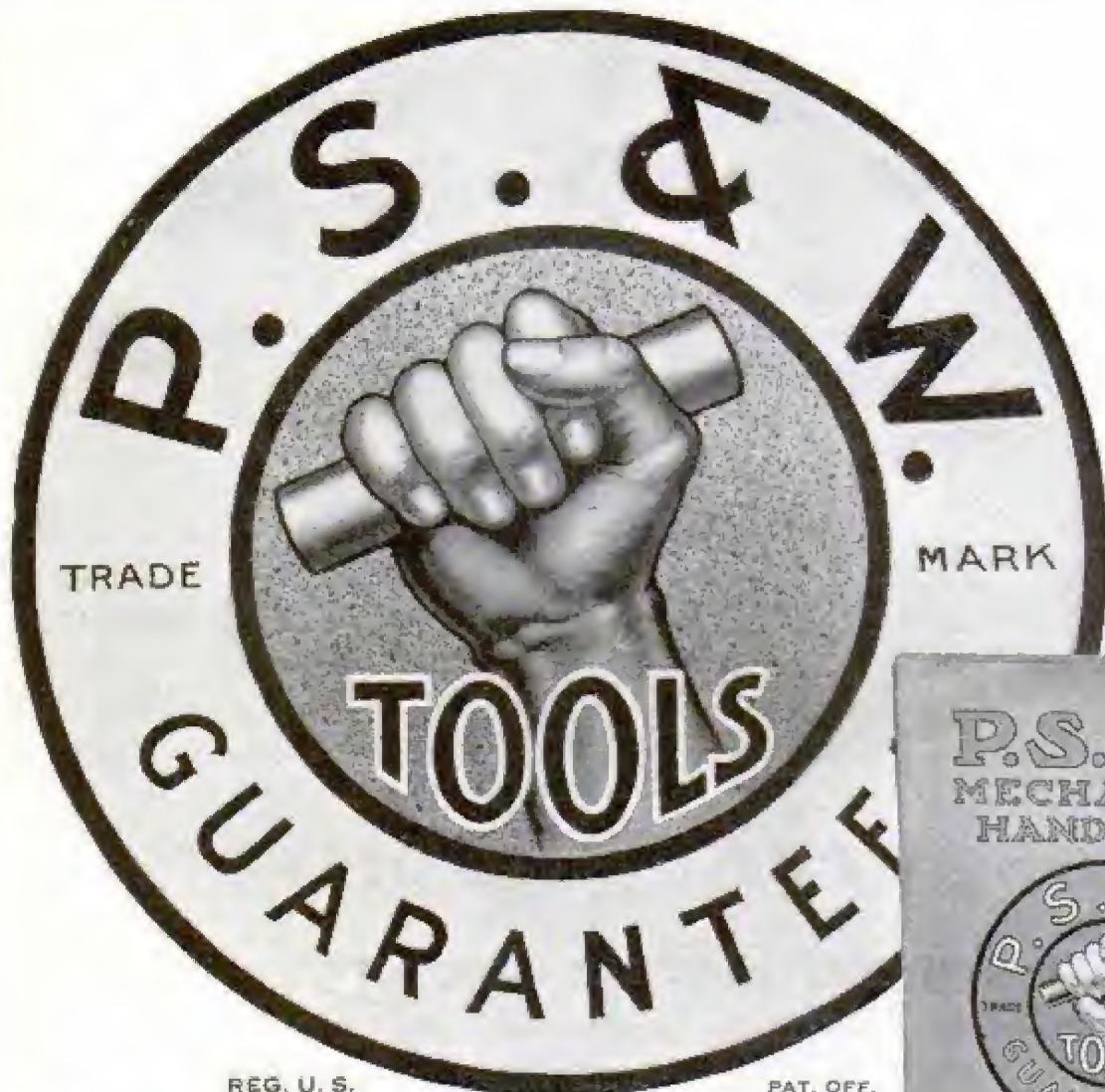
Most electric lighting companies and dealers sell this iron but, if you cannot get one locally, send \$5.75 and we will deliver one promptly through our nearest representative. A three-deck stand, attaching plug and six feet of silk-covered cable are sent free with every iron.

**Be sure to state the voltage of your lighting circuit**

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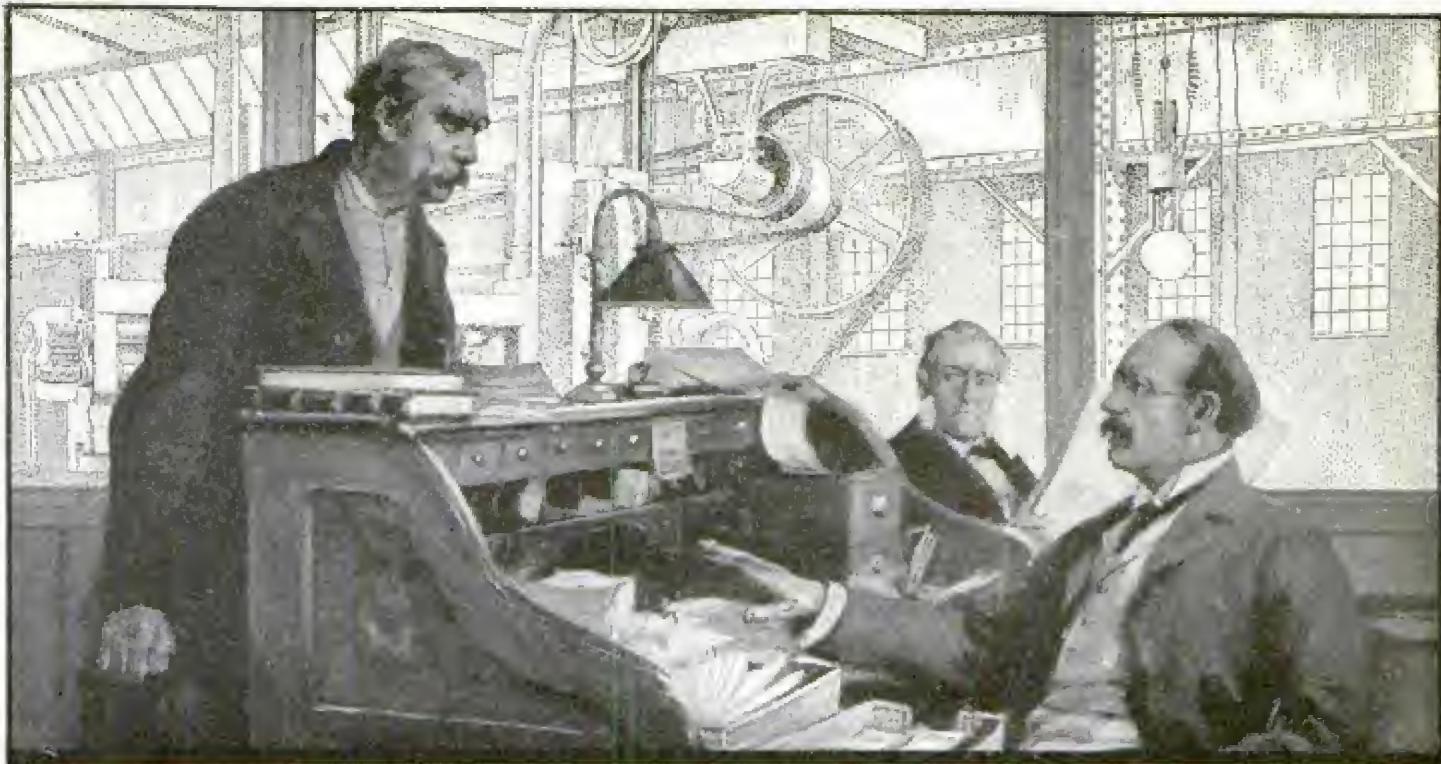
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THE telephone gives the widest range to personal communication. Civilization has been extended by means of communication.

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Each telephone user has a personal interest in the growth of the whole telephone system.

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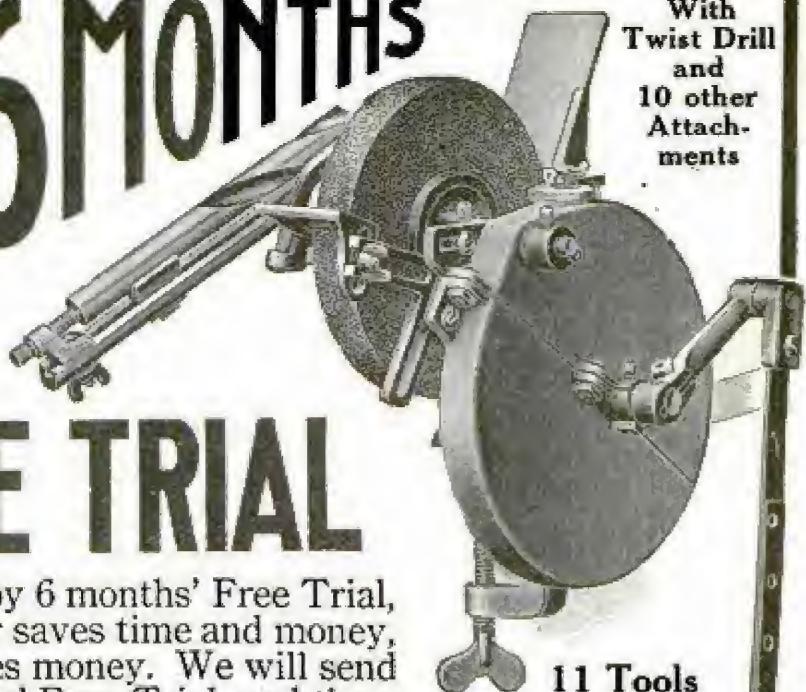
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With  
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and  
10 other  
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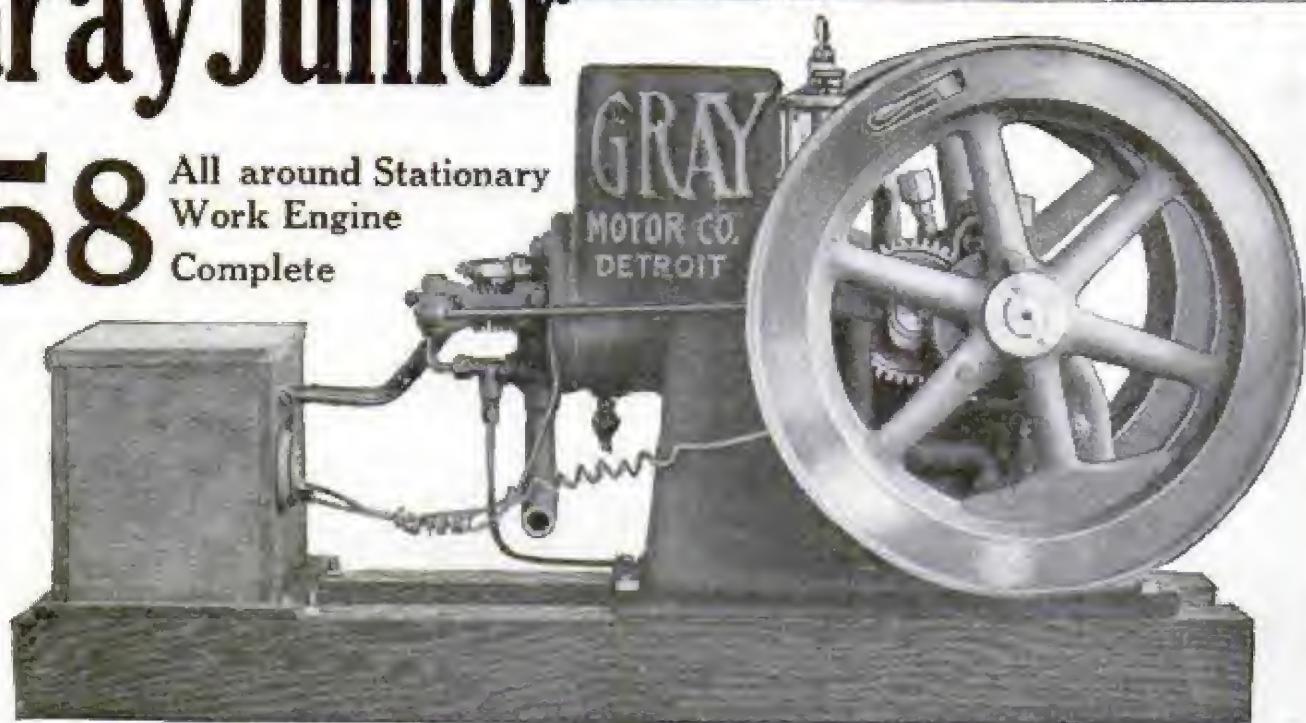
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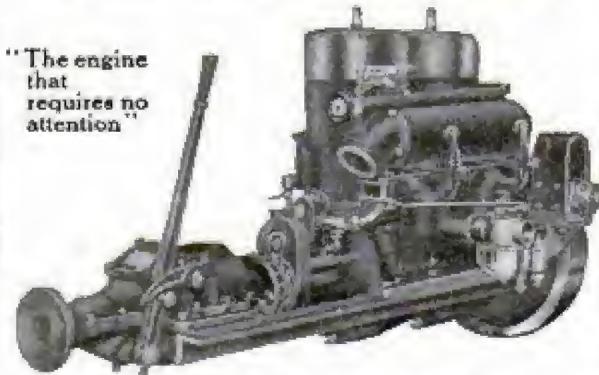
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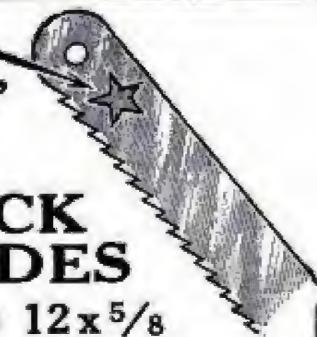
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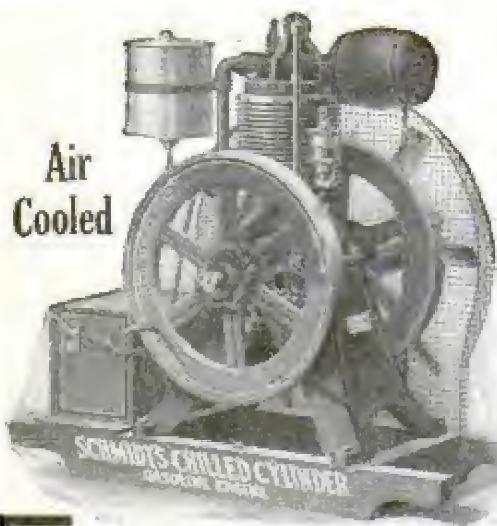
The glycerine in **Pummo** is also a valuable feature. It soothes and heals and keeps the skin soft and white.

**5c** is all it will cost you to try **Pummo Soap**, and one trial will prove its excellence and efficacy.

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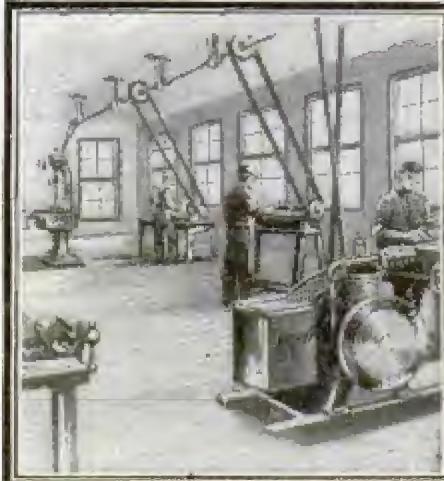
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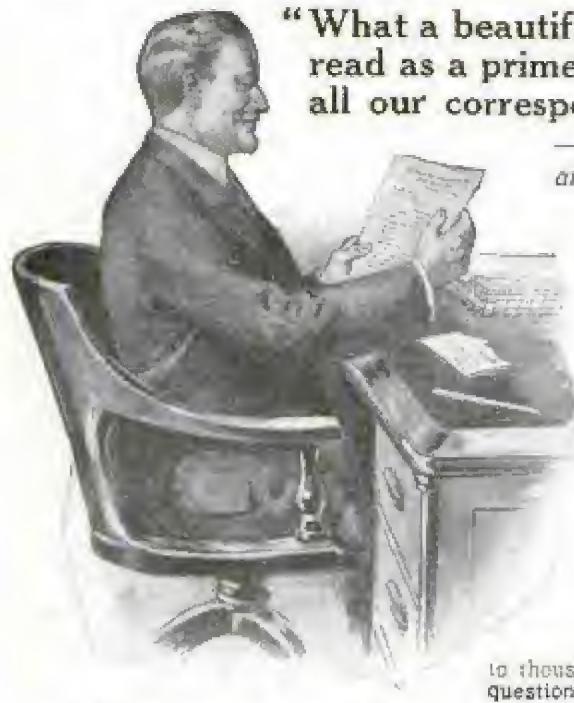
(made in 15 popular shades) and Under-Lac (better than shellac or varnish). If your dealer hasn't samples send us his name and we will mail them to you free.

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In answering  
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Book PA 8

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"What a beautiful typewritten letter—as plain as print—as easy to read as a primer! It must be the new Oliver PRINTYPE! I wish all our correspondents used The Printype Oliver Typewriter!"

*—A composite quotation from ten thousand business and professional men on being introduced to Printype*

ALL eyes are watching Printype. Its attraction is irresistible. Its beauty and grace, in a typewritten letter, are alluring, attention-compelling. Although absolutely new to typewriting, its counterpart—Book Type—has been used on all the world's presses since the printing art had its inception. It is the Oliver ideal of perfect typography applied to typewriter uses.

We had brought the machine to its maximum of efficiency. We had added, one by one, a score of great innovations. There remained but one point—that was *the type itself*.

Then came the inspiration which meant *a revolution in typewriter type*. We would design and produce a new typewriter type face, conforming to the type used in newspapers, magazines and books.

We did! It's here! It's PRINTYPE!

Printype is not an experiment. It is, in all essentials, the type that meets your eye when you read your morning paper, your magazine or your favorite novel. Now that Printype is an accomplished fact, the thought occurs to thousands, why didn't typewriter manufacturers think of it years ago? The same question was asked when, over ten years ago, we introduced *visible writing*.

## A Long Step in Advance

The change from the old-style thin outline letters known as Pica Type, universally used up to now on all standard typewriters, to the new, beautiful, readable Printype, is one of vast significance. It means relief from the harmful effect on eyesight of the "outline" typewriter type. For Printype is as easy to read as a child's primer.

It means less liability of mis-reading, due to blurring of outline letters, whose sameness frequently makes the words run together. Printype letters are *shaded*, just as Book Type is shaded.

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And now, because of its newness, it has the enhanced charm of novelty.

## Printype Now Famous

The reception of Printype by the business public has been most enthusiastic. We withheld any formal announcement until the machine had been on the market for one year. Personal demonstrations were its only advertising. The resulting sales were stupendous. Printype letters soon began to appear among commonplace old-style correspondence. Wherever received, these mysterious, distinctive, beautiful letters awakened immediate interest. Business men began asking each other, "What's that new kind of typewriter that writes like real print?" Thus the fame of Printype grows as its beauty and utility dawn on the business world.

## Ask for Book, Specimen Letter and Demonstration

We will gladly send you a Printype Book, together with a letter written on The Printype Oliver Typewriter. This letter will be a revelation.

Our great sales organization enables us to make an improvement of this character *immediately and simultaneously available to the public*. Press the button and see how quickly an Oliver Agent will appear with a "Printyper," ready to tell you all about it and write several Printype letters for you. Address Sales Department

**THE OLIVER TYPEWRITER COMPANY, 763 Oliver Typewriter Bldg., CHICAGO**

# Printype — OLIVER Typewriter

*The Standard Visible Writer*

## Printype Aids Eyes

The manifold merits of Printype are a constant source of surprise. Printype is restful to eyesight. It delivers its message in the most easily readable form.

The constant reading of thin outline letter typewriting plays havoc with the eyes. It sends thousands to oculists and opticians.

A comparative test of Printype and ordinary typewriting will win you to the type that reads like print.

## We Have Not Raised Our Price

We do not ask a premium for The Printype Oliver Typewriter. We have declared a big dividend in favor of typewriter users by supplying this wonderful type, when desired, on the new model Oliver Typewriter.

Our price is \$100, the same as our regular model with Pica Typewriter Type.

## "17-Cents-a-Day" Offer

You can buy the new Printype Oliver Typewriter on the famous "17-Cents-a-Day" Purchase Plan. A small first payment brings the machine. Then save 17 cents a day and pay monthly. You can turn in any make of typewriter on your first payment.

If the Penny Plan interests you, ask for details.



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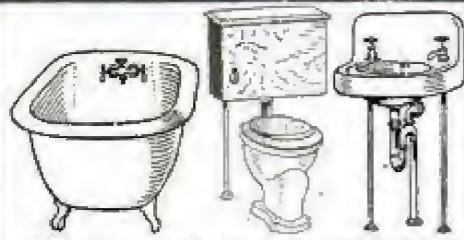
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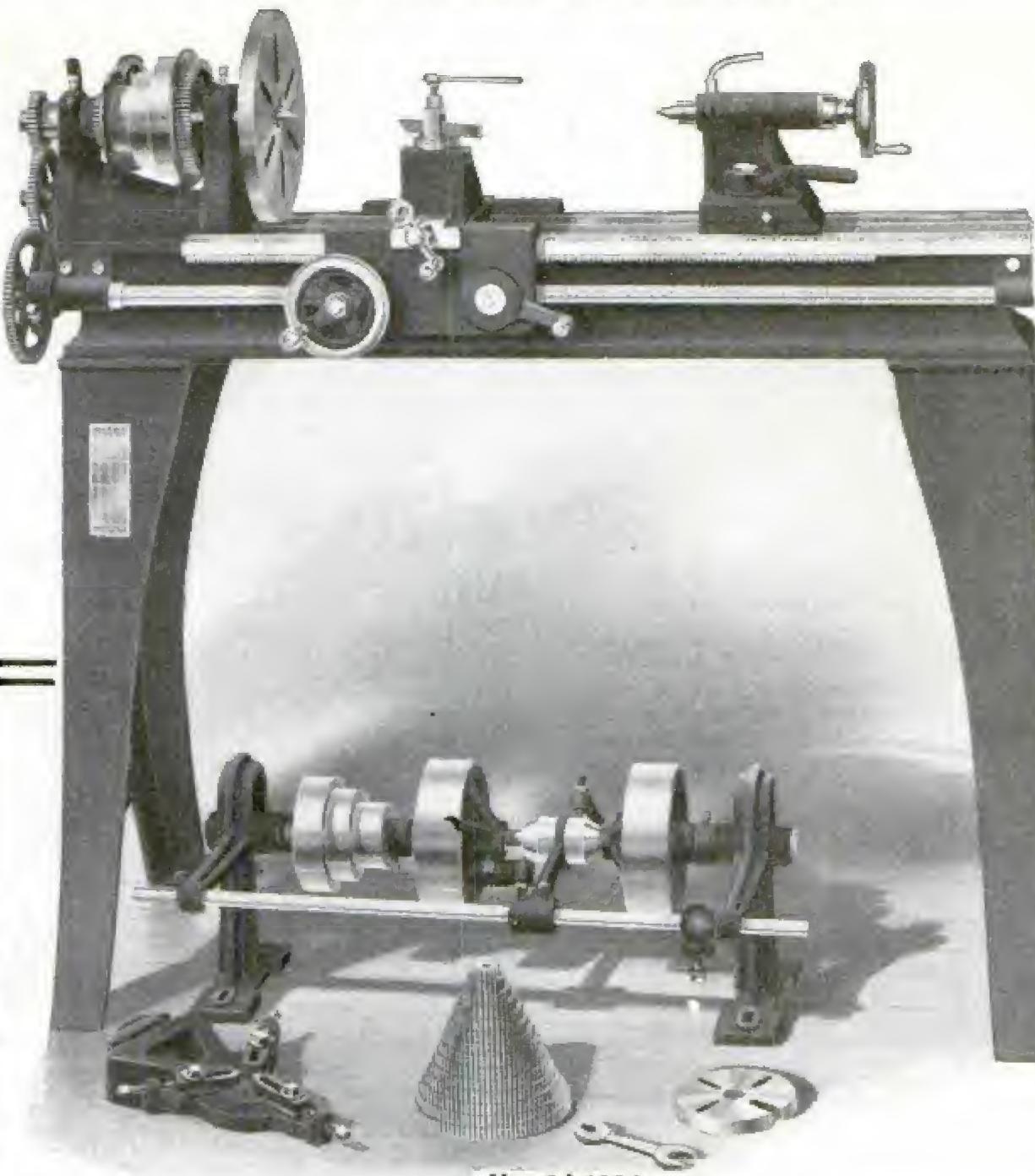
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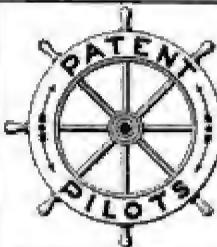
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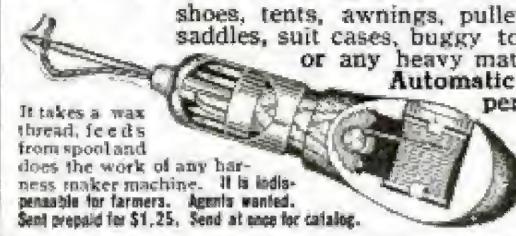
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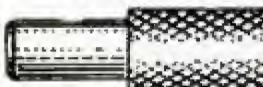
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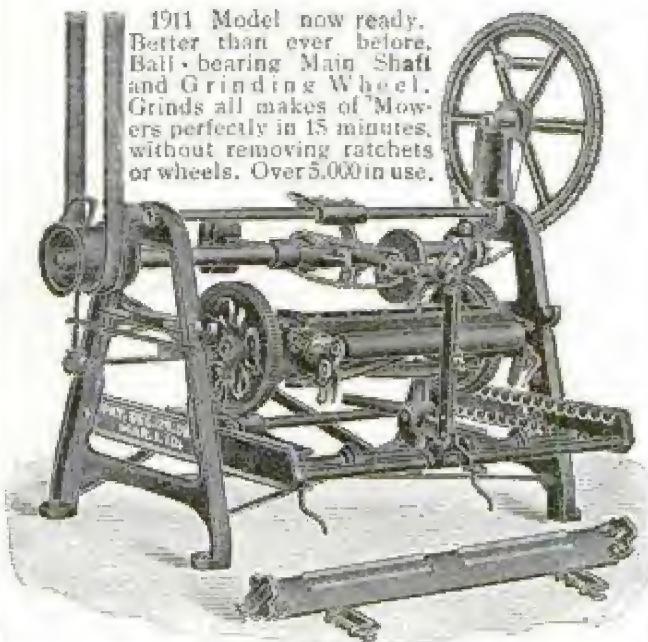
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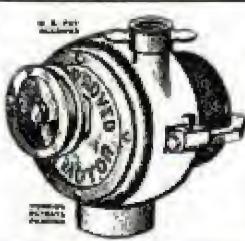
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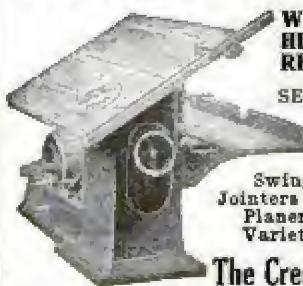


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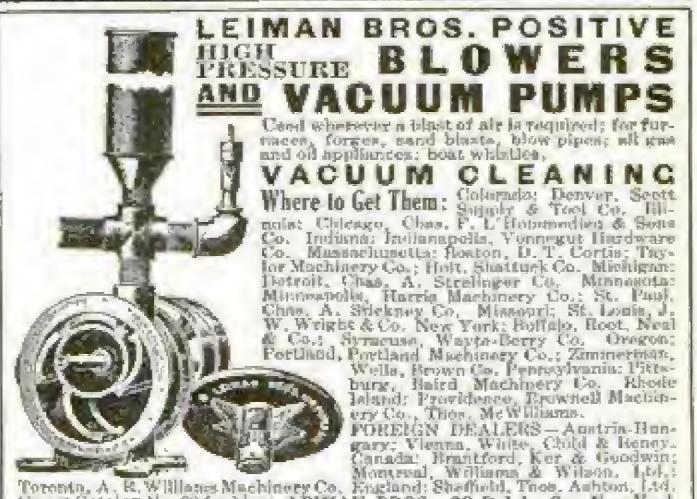
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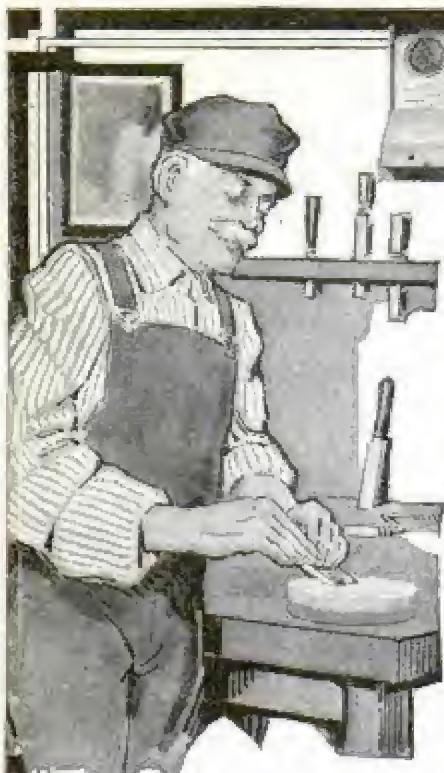
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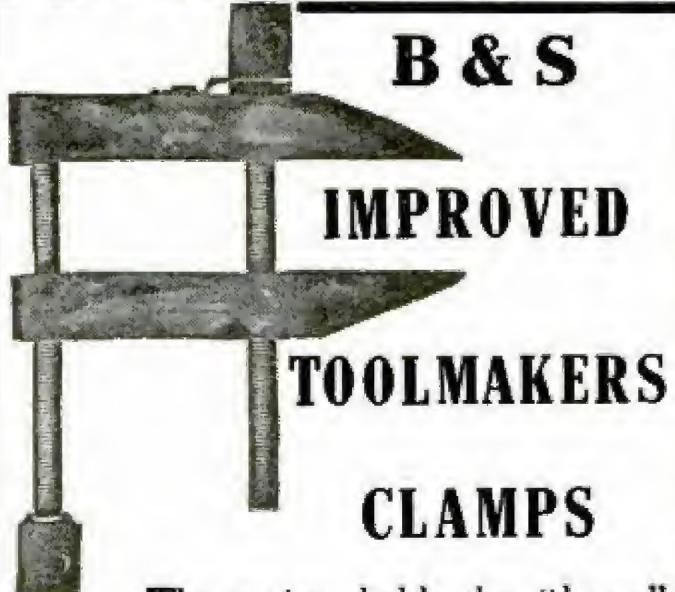
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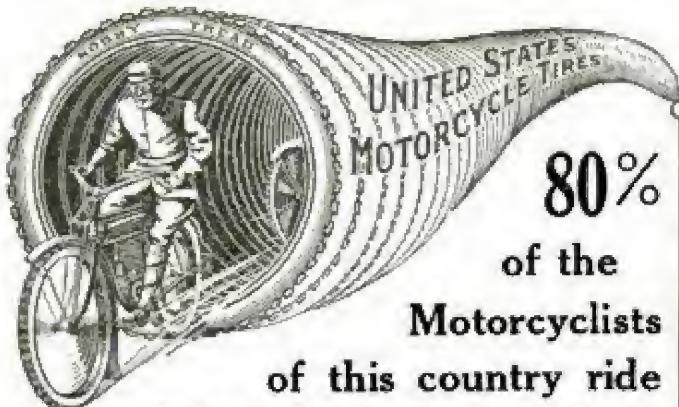
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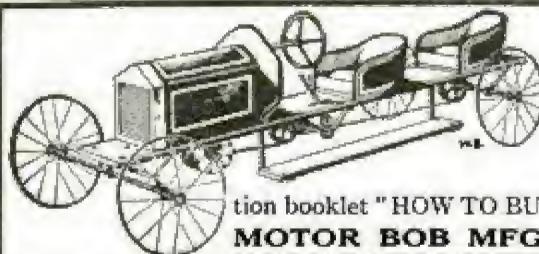
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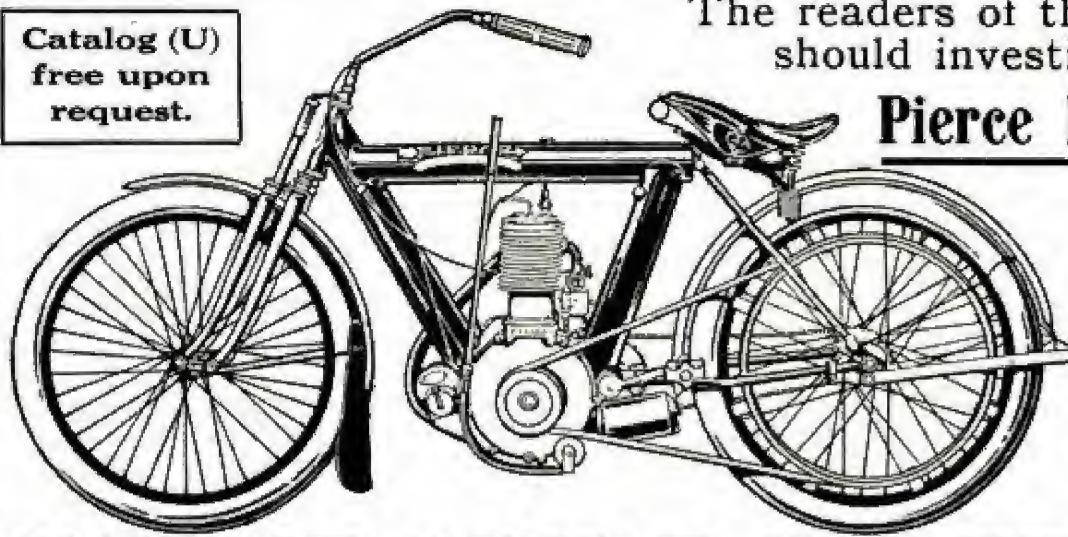
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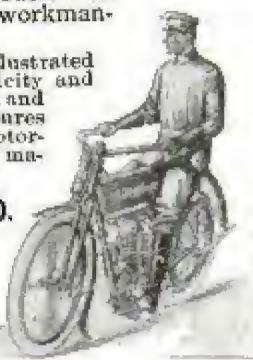
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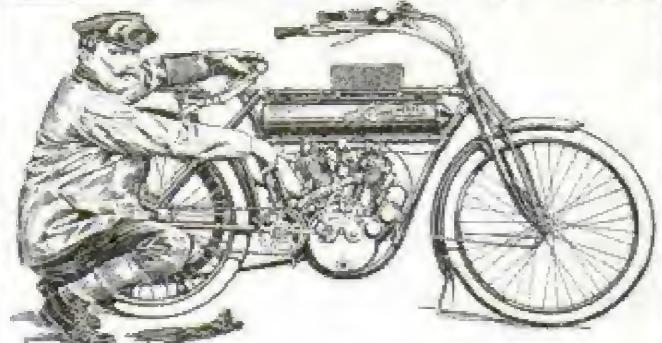
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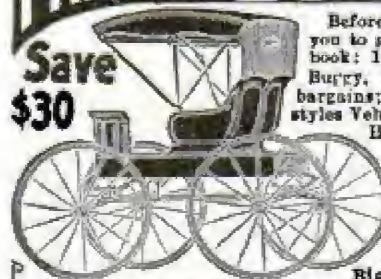
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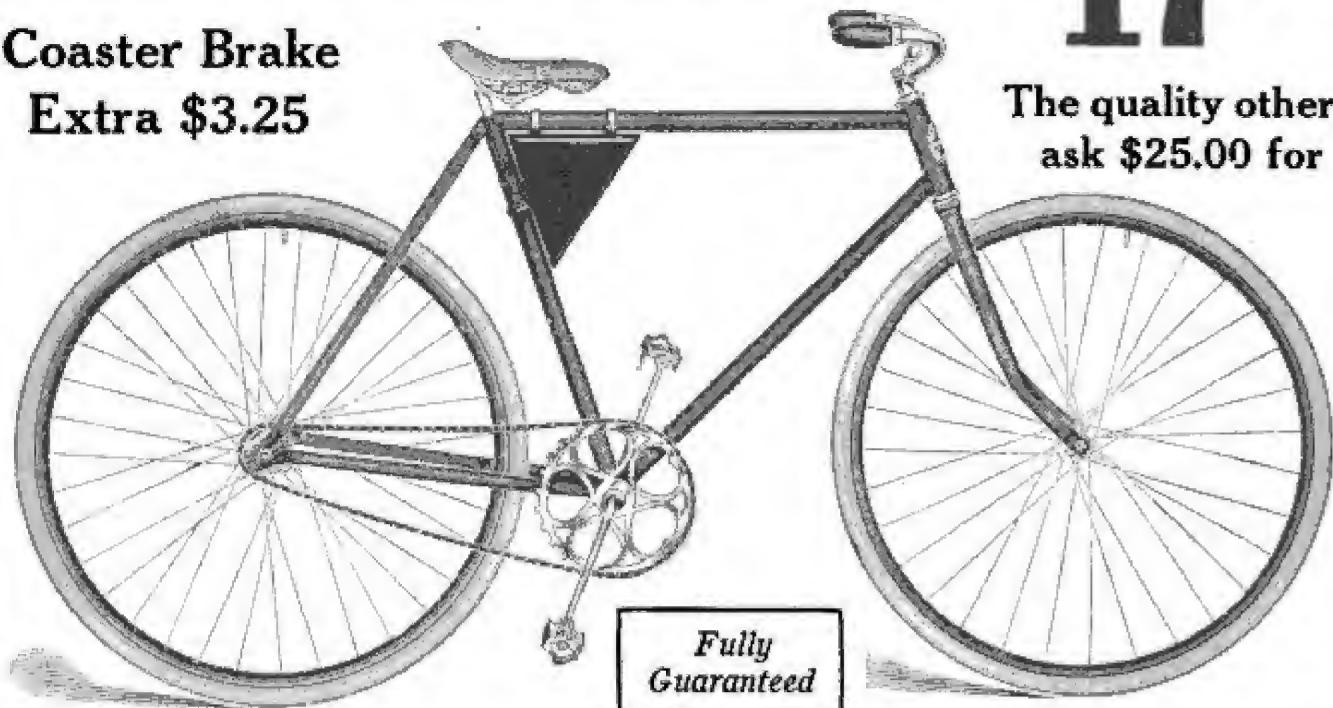
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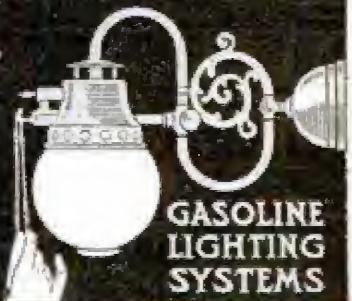
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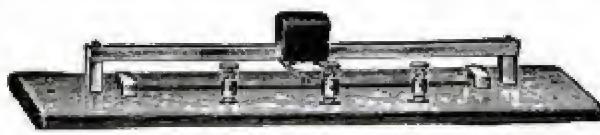
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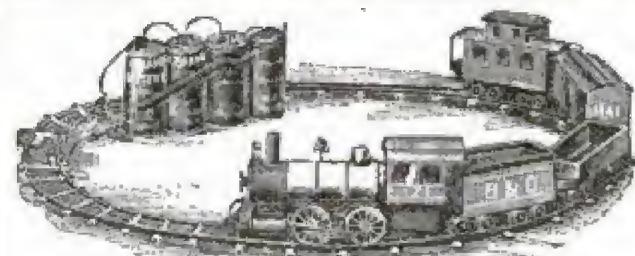


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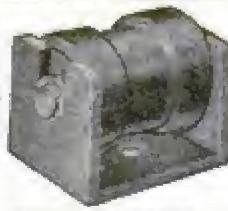
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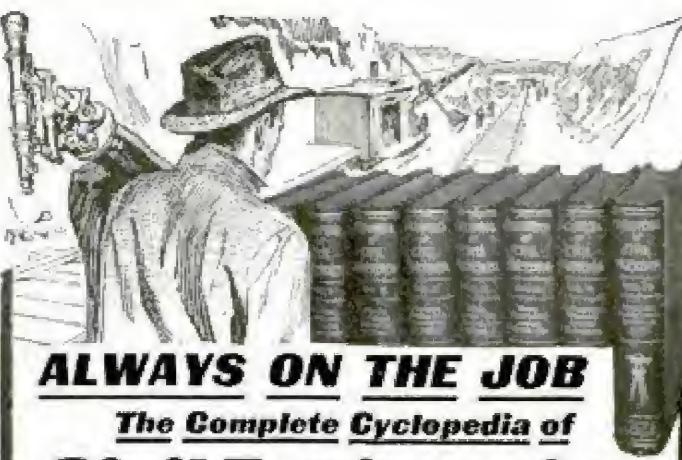
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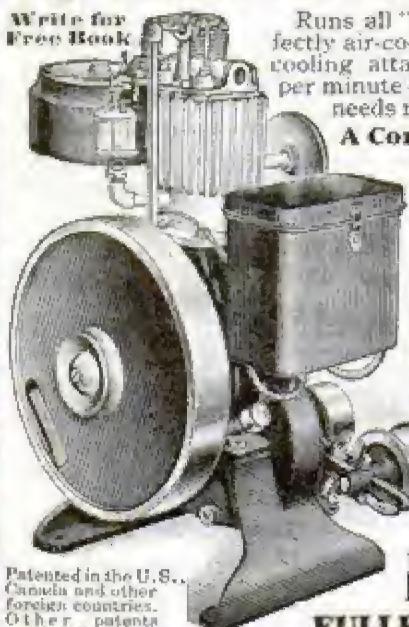
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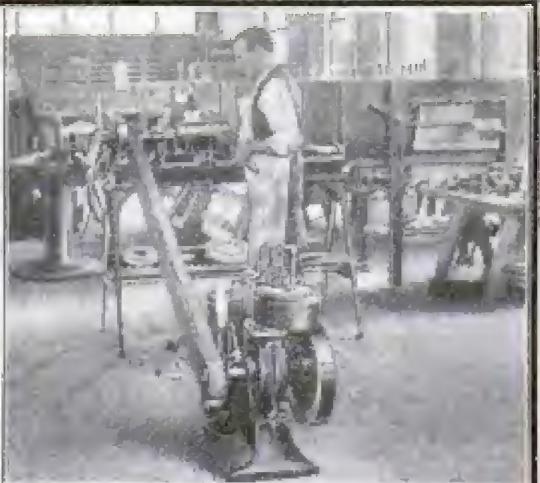
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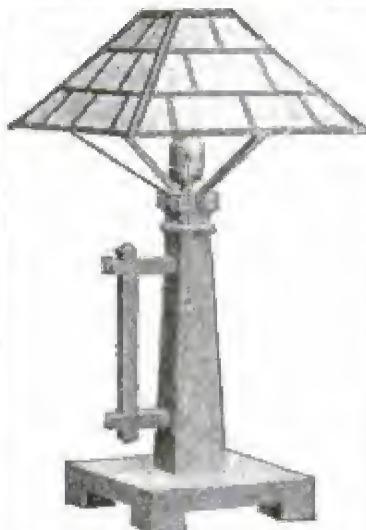
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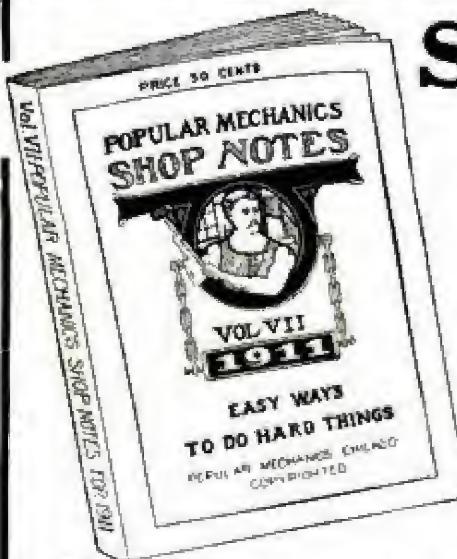
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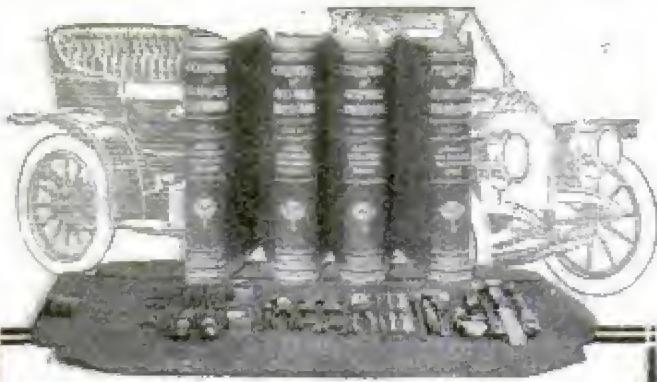
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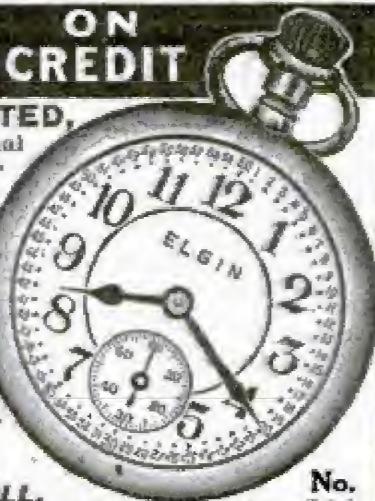
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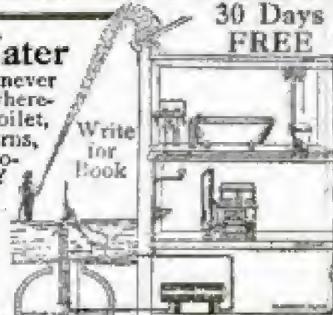
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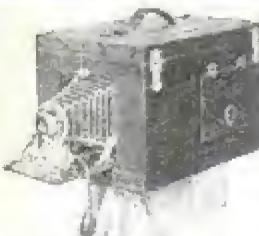
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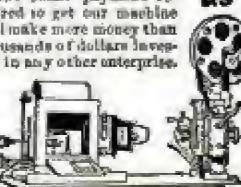
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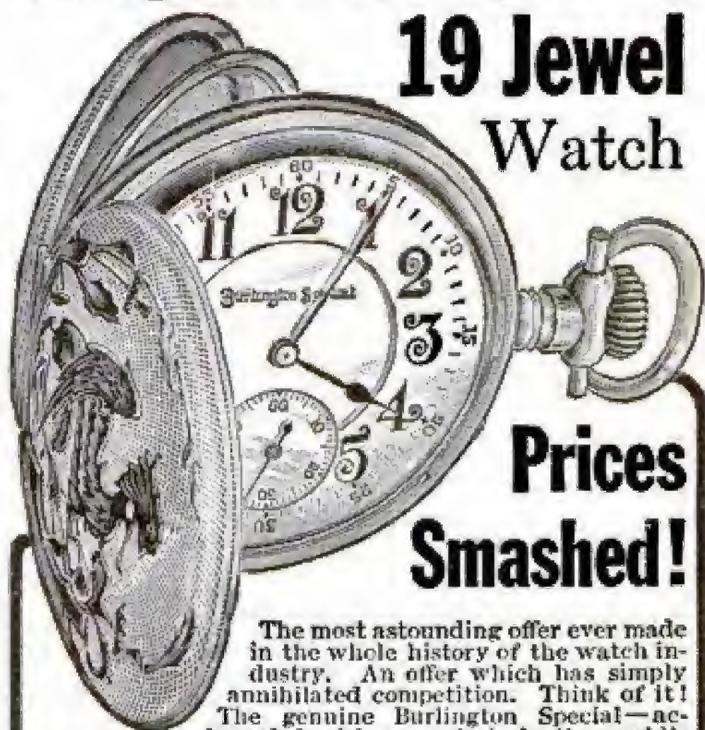
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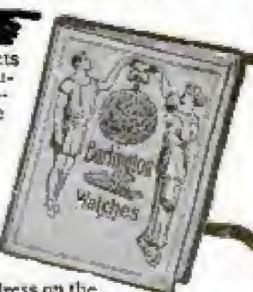
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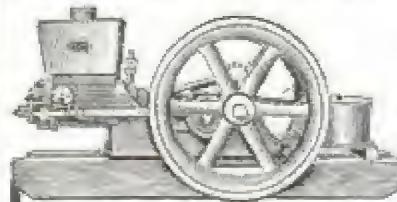
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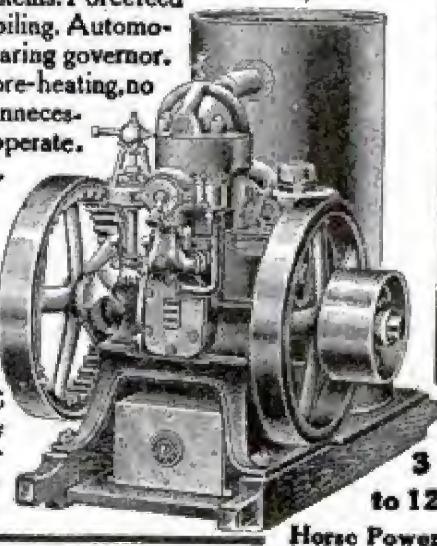
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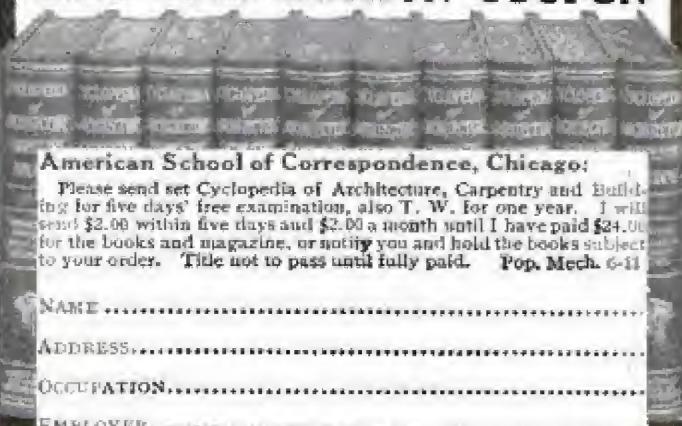
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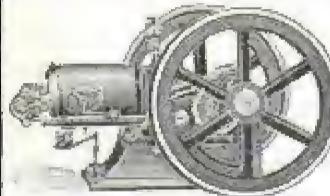
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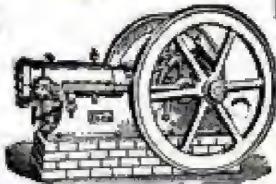
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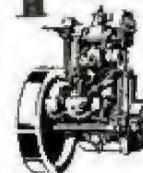
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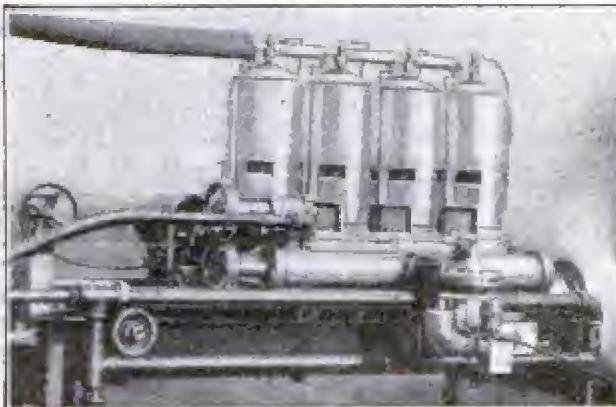
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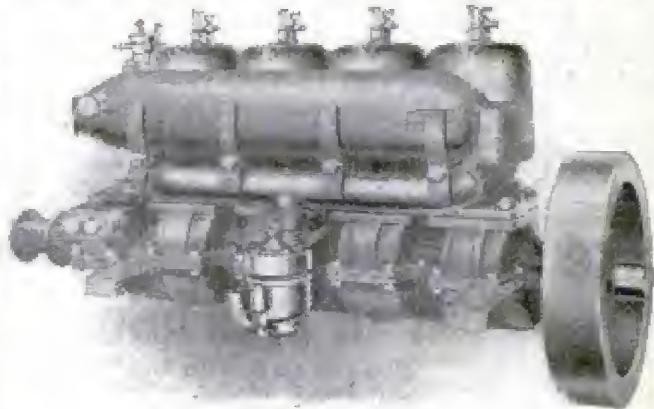
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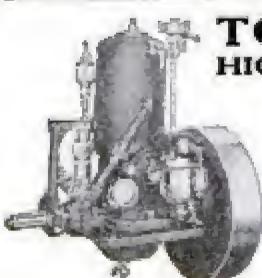
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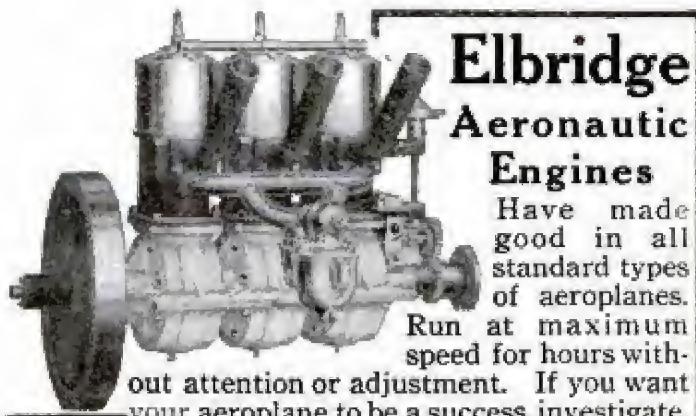
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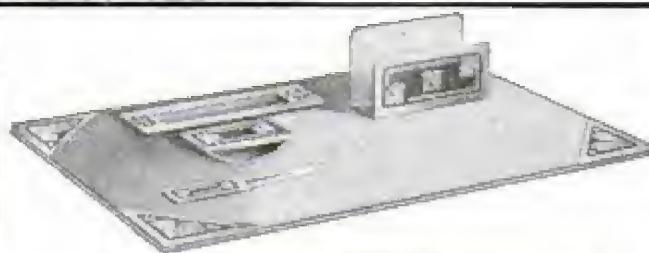
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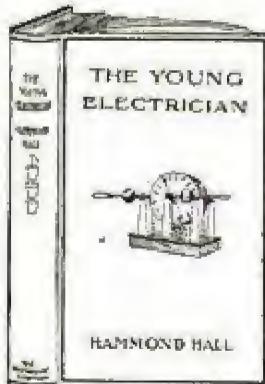
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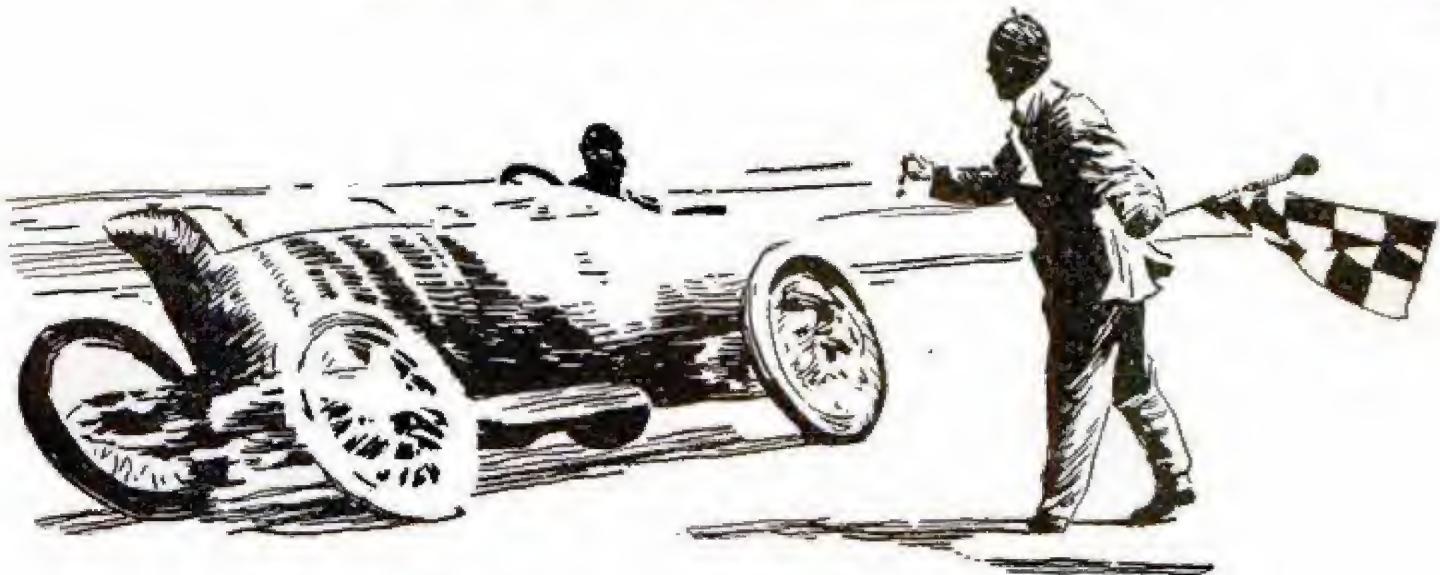
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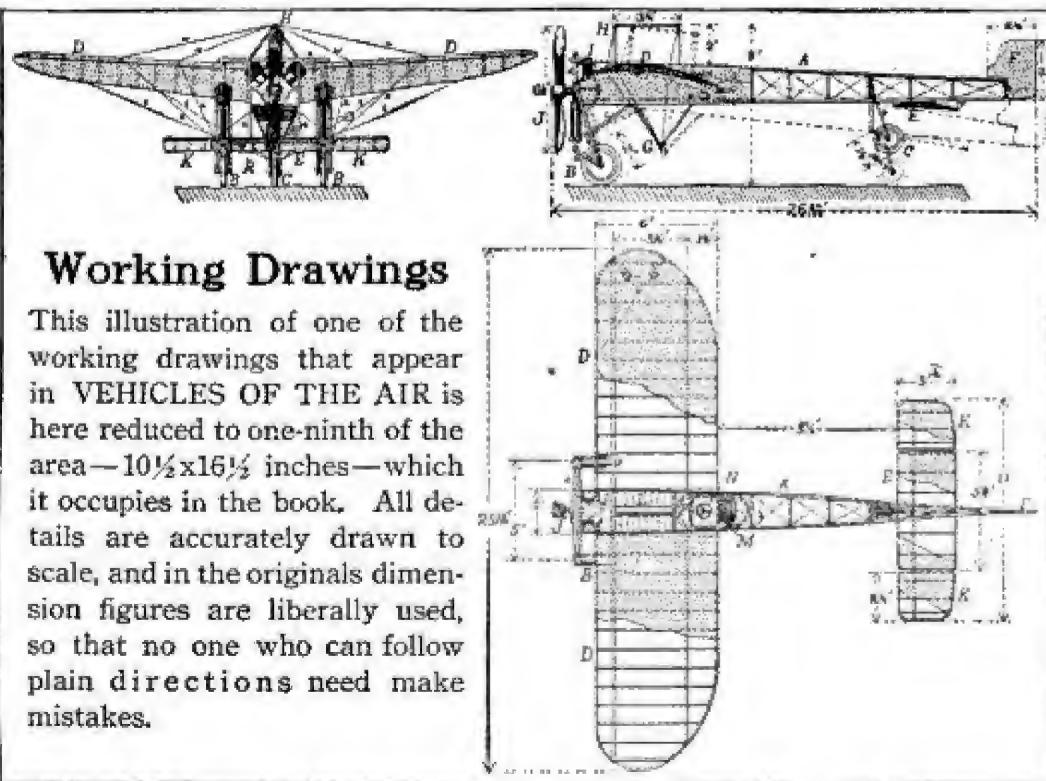
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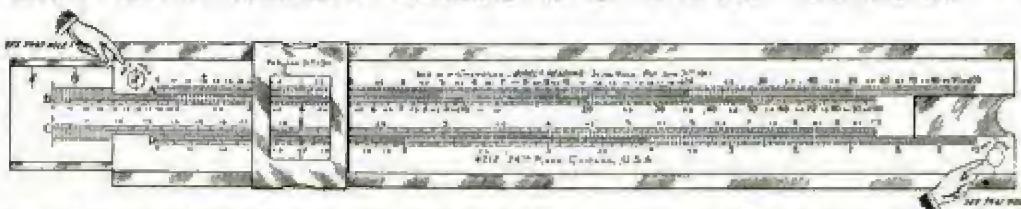
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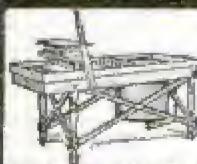
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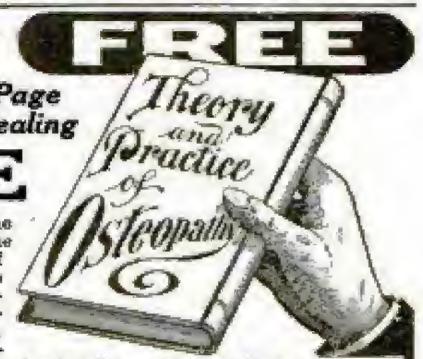
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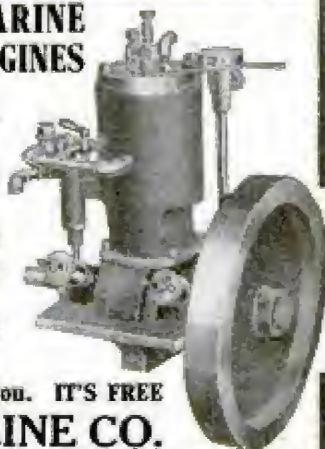
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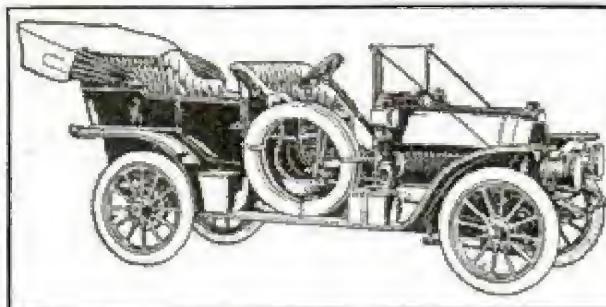
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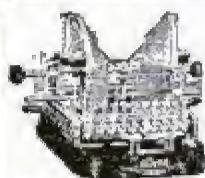
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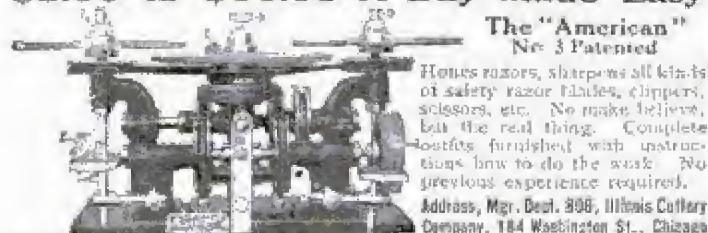
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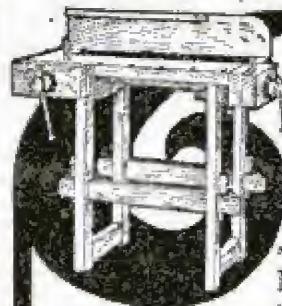
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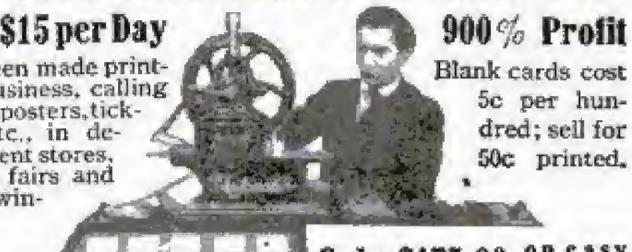
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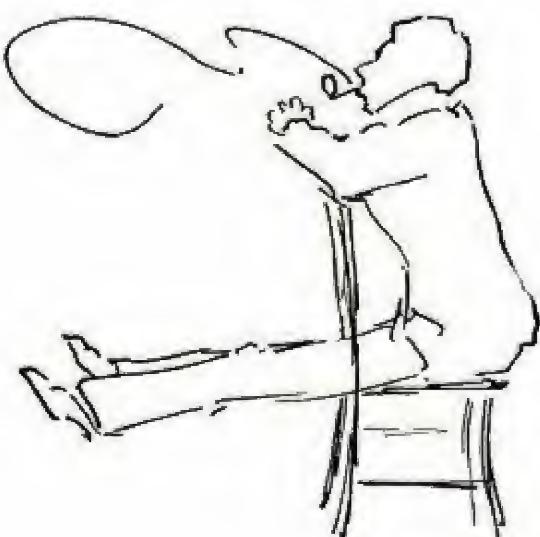
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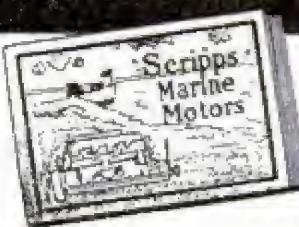
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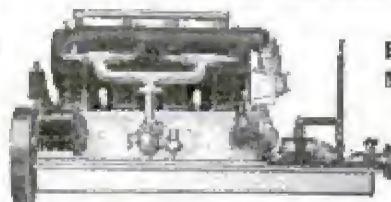
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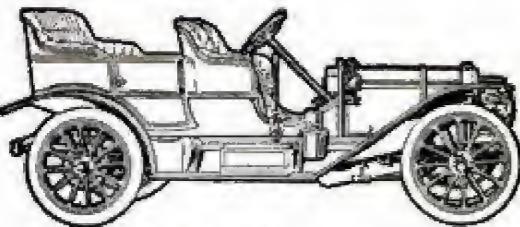
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and easy to operate. Right type and size for craft up to 65 ft.—light, medium and heavy duty—2 H. P. and up. Write for catalog and name of nearest dealer.



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# 501 Persons Have Purchased American Automobile Mfg. Co. Stock to the Amount of \$271,635.00 up to April 1st, 1911. :: :: :: Selling Price Per Share will be Advanced from \$5.00 to \$7.50 June 15th, 1911.

THE first published announcement of the sale of our stock was made February 10th, 1911.

Up to April 1st, 501 people from all sections of the United States and Canada (many who visited our plant at their own expense and investigated our proposition very carefully) have bought stock aggregating \$271,635.

We are going to sell \$500,000 worth of our stock.

Its present selling price is at the par value of \$5 per share.

We believe from the present interest shown in our proposition—from the way in which the stock in our company is being purchased—that by June 15th sufficient stock will be sold to take care of our needs for additional machinery and working capital.

And on June 15th the selling price of our stock will be advanced 50%.

From that date the selling price will be \$7.50 per share.

An audit of our books has been completed, showing our condition April 1, 1911.

Herewith is our financial statement.

Please read this statement through very carefully, keeping the following points in mind:

First: The company owns a splendid manufacturing plant and has large resources with but a small current indebtedness.

Second: Detailed written valuation of the company's real estate and buildings were made by independent and impartial appraisers.

Third: The patents covering the Jonz motor and other patents belonging to this company have been valued at the exact cost to the company.

Fourth: From our surplus of \$28,970.68

the company could declare a 10 per cent. dividend right now.

It is amply justified.

The thought must come to you now that while the possibilities for money making in the automobile business are great—

So great that many automobile manufacturers have declared dividends of from 60 to 1300%—

Nevertheless that there must be some element in our proposition that makes it exceedingly strong—

So strong that 501 persons have bought \$271,635.00 worth of our stock.

Well there is such an element—one that we believe will make our company forge ahead of every other automobile company in this country—

An element that absolutely assures our success, and makes positive the dividends that are bound to accrue to our stockholders—

And that element is the motor used in our automobiles—the celebrated Jonz motor.

Now, whether you know anything about automobiles or not—whether you're an expert or absolutely ignorant of automobile construction,

Know this—the Jonz motor is the only vapor-cooled, two-cycle automobile motor on the market.

Our four-cylinder motor has only nine moving parts—the average motor has ten times as many.

Our 40 horsepower motor weighs only 175 pounds—the average 40 horsepower motor of other types, including the radiator and water, weighs from three to five times as much. This means an immense saving in tire upkeep.

It presents extraordinary points of advantage.

Financial Statement AMERICAN AUTOMOBILE MANUFACTURING COMPANY March 31st, 1911	
<b>RESOURCES</b>	
Real Estate.....	\$ 11,000.00
Buildings.....	122,374.44
Sprinkler System (Fire Protection)	23,000.00
Power Plant.....	4,700.00
Machinery and Fixtures.....	12,126.69
Patents.....	107,019.17
Materials.....	11,703.11
Tools, Jigs and Patterns.....	4,042.21
Finished Cars on Hand.....	3,500.00
Mill Supplies.....	480.00
Office Furniture.....	825.00
Office Supplies.....	320.00
Bills Receivable.....	31,437.50
Accounts Receivable.....	2,818.40
Cash on hand and in bank.....	9,149.62
	<b>\$344,493.14</b>
<b>LIABILITIES</b>	
Bonds (Balance purchase price of plant).....	\$ 24,500.00
Bills Payable.....	2,132.85
Accounts Payable.....	17,255.11
	<b>\$ 43,887.46</b>
Assets Exceed Liabilities.....	<b>300,605.68</b>
	<b>\$344,493.14</b>
Capital Stock.....	<b>\$271,635.00</b>
Surplus.....	<b>28,970.68</b>
	<b>\$300,605.68</b>

It's the simplest motor made "fool-proof"—a child can run it.

And it can be manufactured at a very low cost.

The Jonz motor has been thoroughly tested and has demonstrated its efficiency beyond any question—it's no experiment.

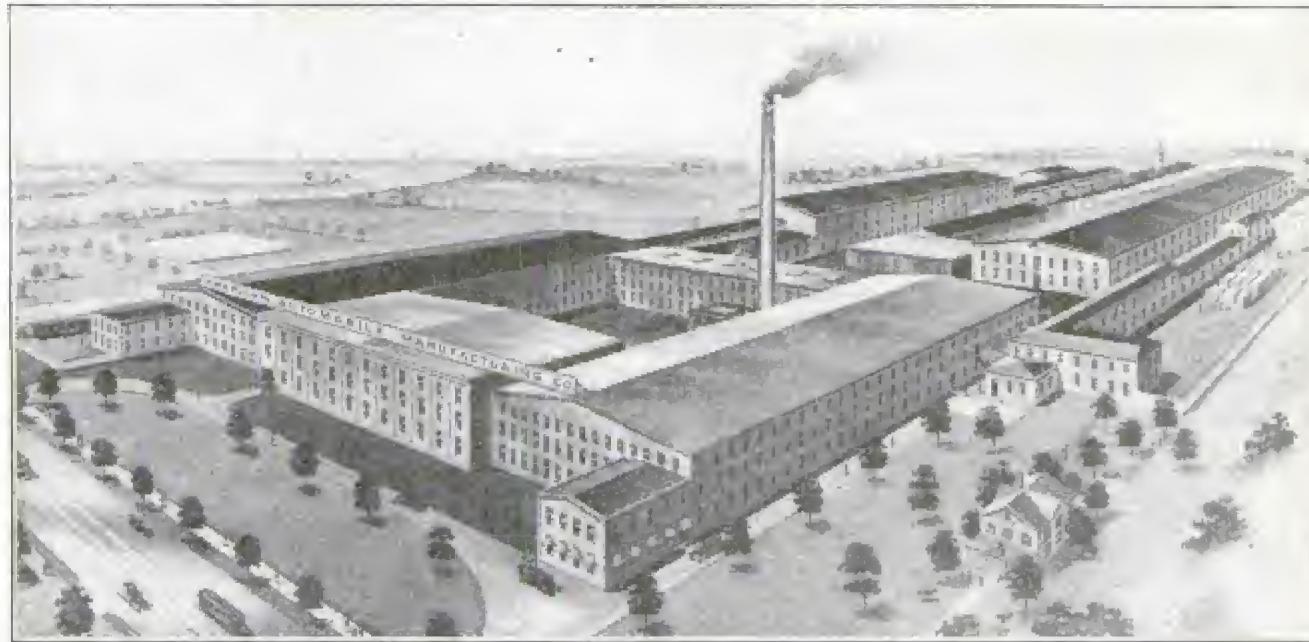
We'll give you the names of people who own Jonz motors, *to whom you can write* for first-hand information as to their simplicity and reliability.

You must do it—stock advances from \$5 to \$7.50 per share June 15th, and that's not far off.

After you've read our literature, should you want further information come to the factory.

Meet our officers—see our factory—ride in one of the Jonz cars.

If you buy \$1000 worth of stock or more we'll pay your transportation from any point in the United States.



Plant of the American Automobile Mfg. Co. at New Albany, Ind., opposite Louisville, Ky.—  
Over 5 Acres Floor Space

Those who buy American Automobile Mfg. Co. stock we believe will find it the most profitable investment they have ever made.

Every man connected with the management of the company has years of successful business experience behind him.

They are devoting their entire time to the interests of the company.

All the stock is common stock—fully paid and non-assessable; *every share* issued has been paid for—there is no promotion stock.

All stockholders share alike in the profits of the company—in proportion to the amount of stock held.

Now, we would advise you to send for our literature at once.

It pays us to do this, since everyone who has been here has purchased stock and has told his friends, who have in turn purchased stock.

If you find our proposition not as herein represented we will pay your transportation anyway.

Fill in the coupon for prospectus and literature—and send to us to-day. Do it now.

## American Automobile Manufacturing Company

105 Vincennes St., New Albany, Ind.

### From 60% to 1300% Dividends Coupons for Popular Mechanics Readers

American Automobile Manufacturing Company, 105 Vincennes St., New Albany, Indiana.

GENTLEMEN:—Kindly send me your book—"From 60% to 1300% Dividends" relating to stock in American Automobile Manufacturing Company.

Name..... Address.....

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**PLACED in POSITION** at above Salary.

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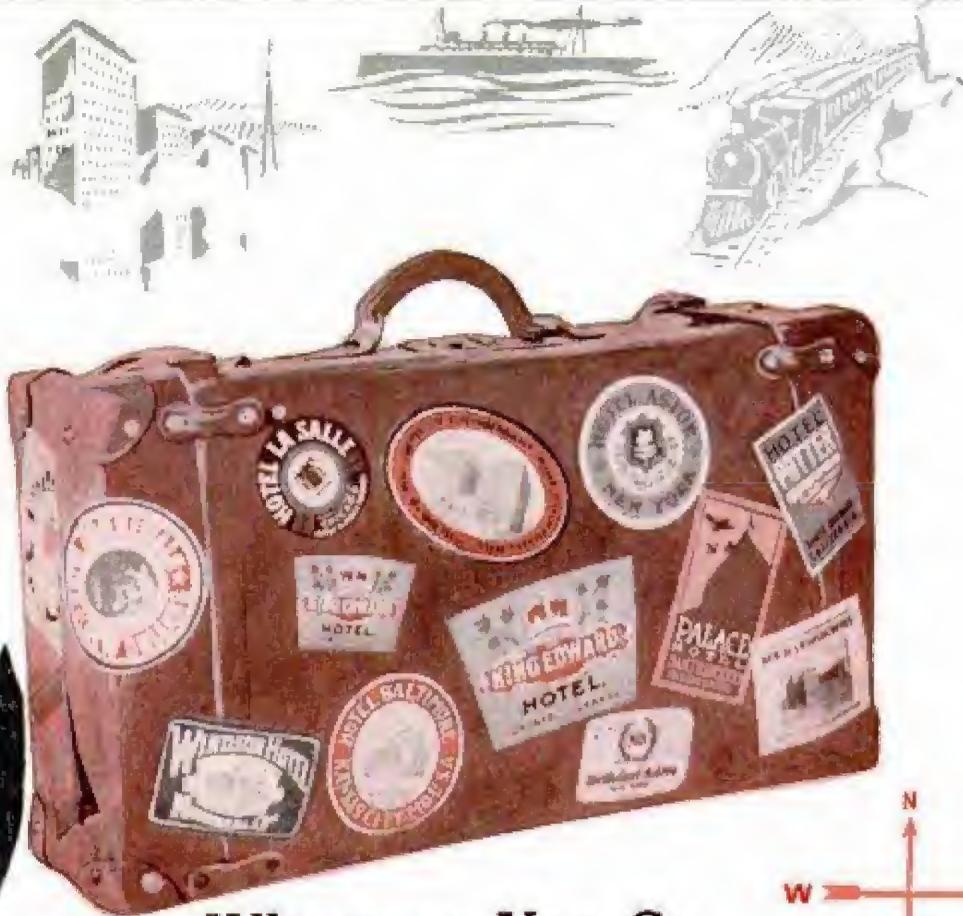
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